JUNE, 1957

Commercial Fertilizer

and PLANT FOOD INDUSTRY

DO YOU NEED EXPERT HELP ON A PRODUCTION PROBLEM?

SEE PAGE 19

(Advertisement)

Take a good look at your multiwall bag!

Like women's bathing suits, multiwall bags also reveal the passing of time.

Is your bag a vivid, modern example of your business vitality . . . or is it dull, drab and lacking in appeal?

Is your bag the ideal package for your product, in size and construction, or is it a carry-over from the past?

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Dependable as a service for 3 generations

The Newest
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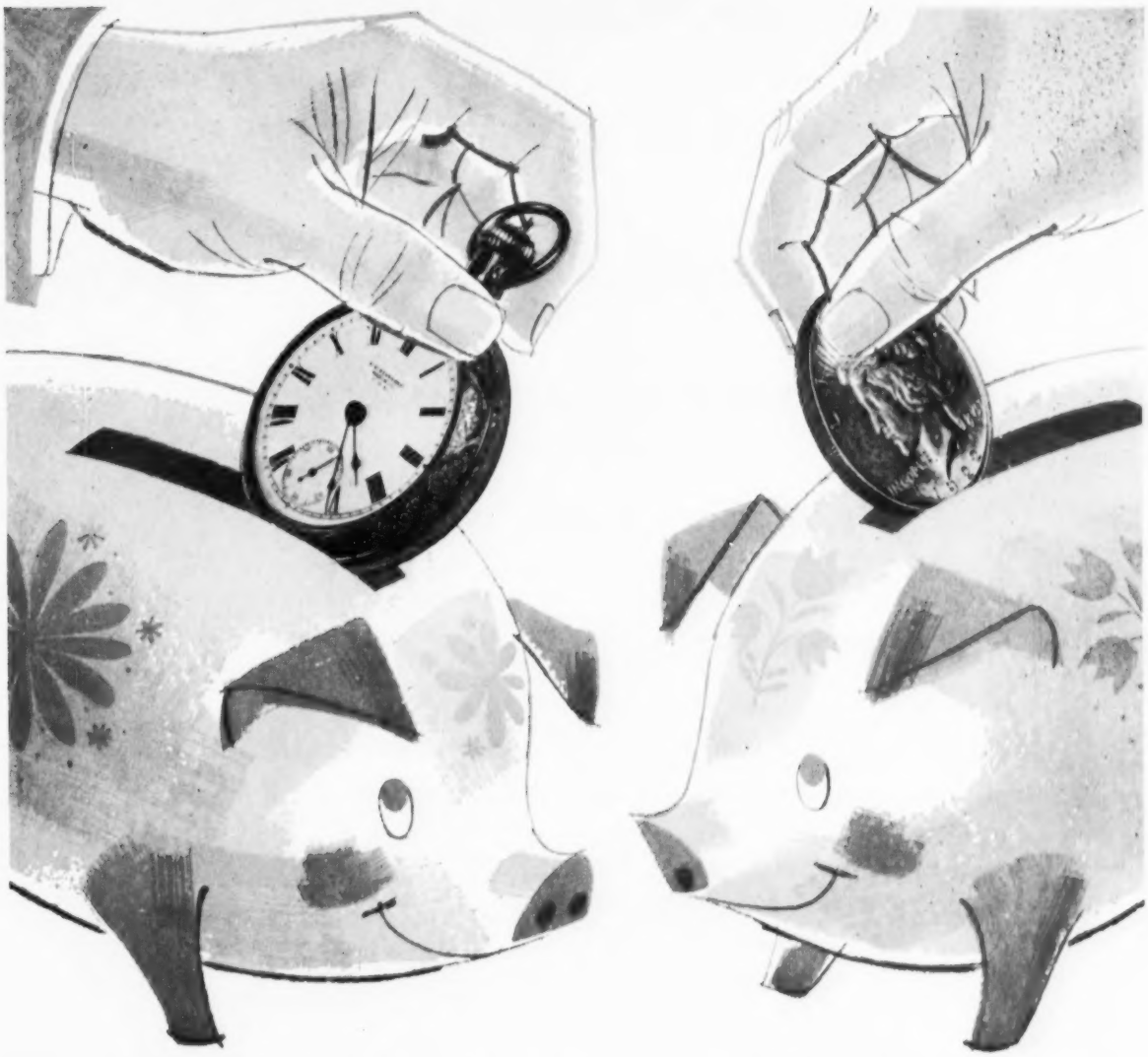
PRODUCT MFD_____ OF



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ORDER NITROGEN PRODUCTS FROM SINCLAIR NOW

There are two big reasons why you should sign now with Sinclair for your supplies of nitrogen solutions, anhydrous ammonia and aqua ammonia.

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Second – your seasonal supply problem can be solved by this plant's vast storage capacity . . . products will be delivered when you need them to meet your production schedule.

Let Sinclair help you solve your nitrogen supply problems and save you time and money in the bargain. Phone or write . . .

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(Affiliate of Sinclair Refining Company)

600 Fifth Avenue, New York 20, N. Y. – Phone Circle 6-3600

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WE WILL TAKE YOU TO SEE

PLANTS THAT HAVE PRODUCED

40-50 TONS PER HOUR OF

CLOSELY SIZED GRANULAR

THROUGH 2 FULL SEASONS

OF HARD, STEADY RUNNING

This season, more than 500,000 tons of granular fertilizer, all sized through 6 mesh and retained by 16 mesh screen, are being produced by the

WEATHERLY CONTROLLED GRANULATION PROCESS
20-60 TONS PER HOUR

There can be no question that this process is the Standard of the Industry. It is the only one that will turn out closely sized, quality granular fertilizer at such volume.

Let us show it to you in operation at well-known plants that have used the process two seasons or more. Let us show you the actual goods coming off the belt at the end of the line.

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WEATHERLY DiaPhos PROCESS?

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Vol. 94 No. 6 *Established 1910* June, 1957

Commercial Fertilizer and PLANT FOOD INDUSTRY

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Commenting Freely

by BRUCE MORAN

We have made no survey; we have just checked here and there in the South and the mid-West . . . so this is nothing official. But we were delighted to find that a number of major fertilizer suppliers, who had expected a sharp drop in volume this season, have found business not only up to par, but in some cases well ahead of last season.

This is in direct contradiction of speeches that have been made and articles that have been written about the havoc of the Soil Bank. There seems to be plenty of foundation for distress among farm machinery people, field hands and others—because smaller acreage calls for less equipment and less labor. But the fertilizer picture indicates that the Soil Bank is teaching farmers to use plenty of plant food to get a bigger crop on fewer acres.

If this is the result, the long-range picture will be good for all those who are now suffering, because the farmer will make more per acre—and so he will buy more in the future. Poor consolation just now, perhaps, but something mighty big to anticipate.

From front office to finished goods

"International's Triple cuts our costs right down the line"

says Carl Sparks, Vice-President of Buhner Fertilizer Co.

In the front office of the Buhner Fertilizer plant at Danville, Ill., Carl Sparks keeps a close eye on delivery schedules and shipping costs. Out on the production line, Plant Superintendent Chuck Everhart carefully checks product quality.

With production costs on the way up, both agree the extra savings they get with International's Triple spruces up their profit picture. And with other Buhner plants at Seymour, Ind. (where general offices are located), and at Havana, Ill., these savings add up fast.

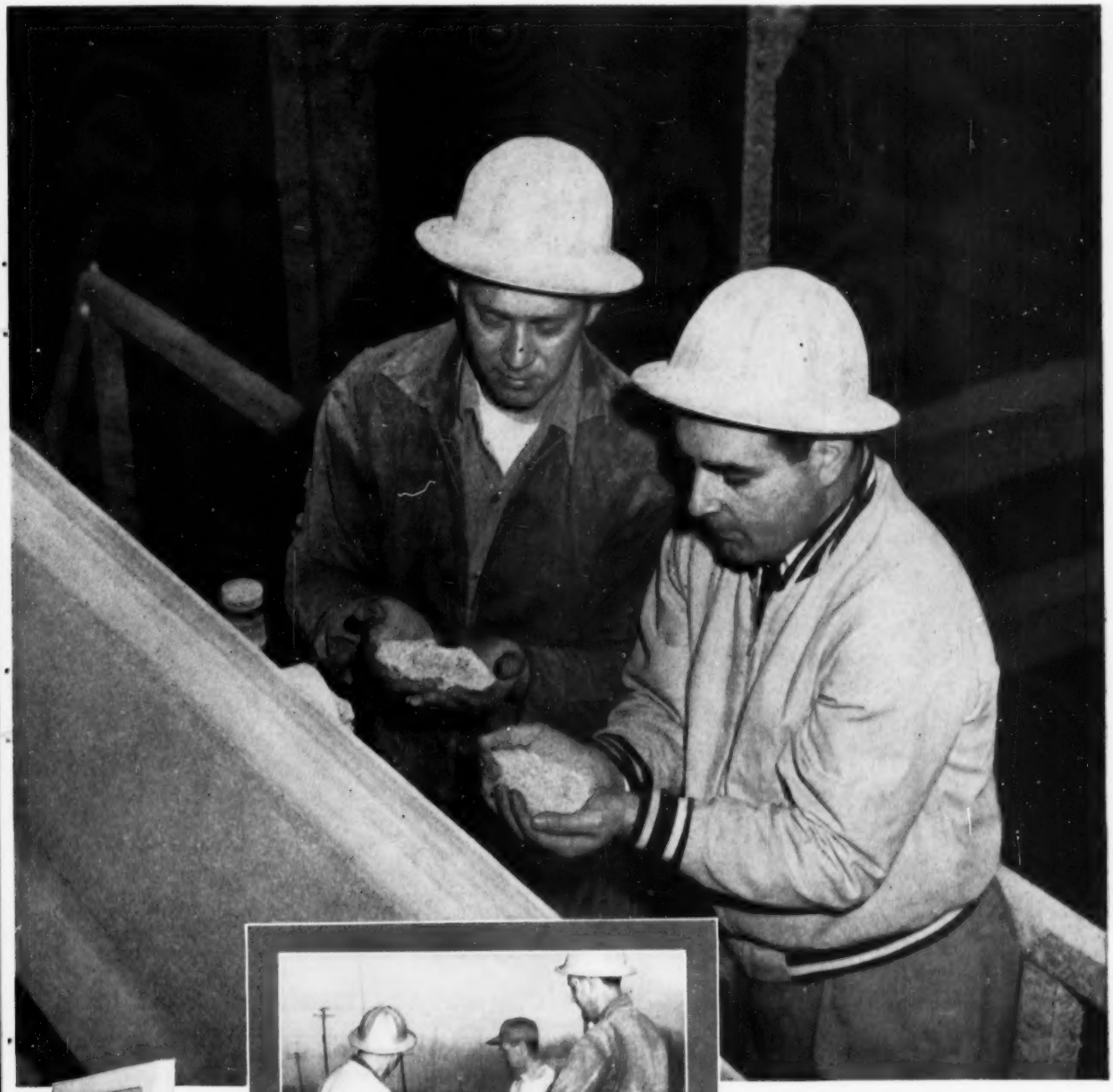
Big items in savings are International's dependable service and delivery. "Barge shipments up the Illinois River to Peoria mean substantial savings at all plants," says Sparks. "Even more important, we've learned we can rely on International's Triple to arrive on schedule."

In the plant, Everhart reports uniform high analysis and consistency of particle size mean savings in formulation costs . . . improved granulation.

You can realize similar savings by using International's Triple. Write or wire for full information on prices, shipping and warehousing arrangements.

Carl Sparks, vice-president and general manager, has been with the Buhner Fertilizer Co. for 22 years. Photo on desk is of F. F. Buhner, who founded the Seymour plant in 1889. As president, he maintains active leadership in the Buhner organization.

Technician Ken Ohmer watches product quality, tests soil samples in Buhner's chemical control laboratory.



International's Triple has the uniform particle size, "quick-wetting" characteristics important in granulation, report plant foreman George Hinkle, left, and Superintendent Chuck Everhart.

Pelleted and semi-granular fertilizers are sold under Buhner's Happy Farmer brand name in a 5-state sales area. Mixed goods are also shipped in bulk.

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

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consists of 4 husky teeth hinged on a bracket behind the bucket. Teeth dig only when bucket is lowered and machine travels in reverse — do not interfere with normal bucket operation . . . are quickly removable.

New scarifier attachment quickly rips-up packed fertilizer

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This is another example of how you get more and better performance from a "PAYLOADER". Standard operating features of the new, 1 cu. yd. Model HAH "PAYLOADER" include: 45° bucket roll-back at ground level; hydraulic load-shock-absorber; power-transfer differential; powerful breakout digging action; power-steering and hydraulic brakes. Ask your "PAYLOADER" Distributor to demonstrate what a Model HAH or other sizes will do for you. See him, or write us.

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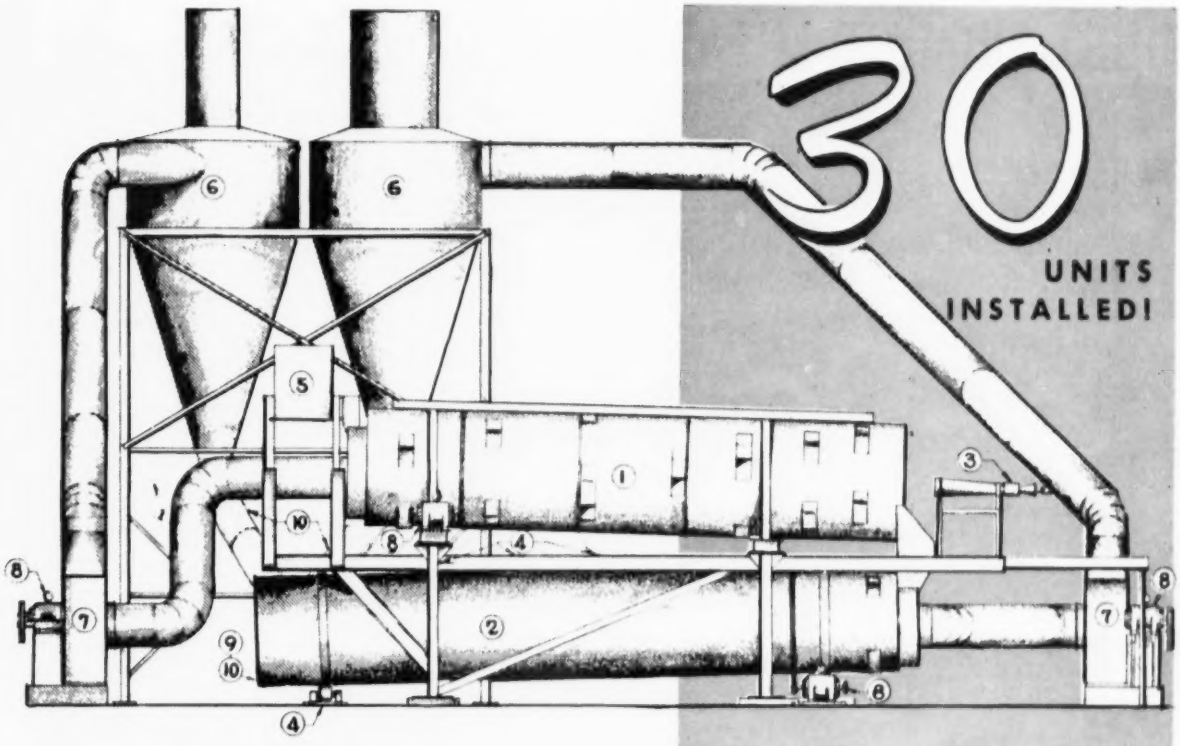

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10. **MINIMUM RECYCLE:** From screen and cyclone returned to mixer or ammoniator.

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THE BLUE V GRANULATOR

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JUST AROUND THE CORNER *by Vernon Mount*

BUDGET cutting is a sort of game they play in Washington. They make the magnificent gesture of chopping billions from the totals. And that looks fine to the folks back home. But a half year later, when the various Government agencies begin to run out of money...then supplementary budgets are voted, quietly and without fanfare. So the net result is about the same.

SPENDING is a different matter. Actually a lot of money voted in previous budgets is still in the lock-box, put aside - not for a rainy day - but until projects can be brought to the point of putting in the cash.

TAX CUTS will be less than you've heard. Perhaps 3 billion; perhaps less than that. Don't forget that next year is the Congressional year.

Yours faithfully,

Vernon Mount

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CGC ATLANTA CLEVELAND DALLAS KNOXVILLE MEMPHIS MOBILE NEW YORK 17

CHANGES

Mexican Gulf Sulphur stockholders at the annual meeting reelected the board of directors, who were being challenged by a portion of the stockholders, 482,614 to 351,622.

* * *

Two **Olin Mathieson** changes: Expanded warehouse facilities in Chicago established by the plant food division, **John H. Brown,** district manager; Plant food division area headquarters at 426 North High Street, Columbus, O., to be managed by **Charles A. Wood.**

* * *

Fabricated Metals, San Leandro, Cal., has formed a wholly owned subsidiary, **Fabricated Metals Western Export** to sell liquid fertilizer plants and storage throughout the Western Hemisphere, according to president **C. B. Coleman.**

* * *

Will-DuPage Service Co. has purchased the 6 **Will County** (Ill.) **Cooperatives** and now has eleven plants, which makes them, according to local advices, the largest of the affiliates of Illinois Agriculture Association, which has 100 member companies. **R. L. Charley** is general manager.

* * *

Standard Oil of California has established a new company, **California Chemical Co.,** to consolidate expanding chemical activities, and coordinate **Cal-Spray** and **Oronite** which become subsidiaries.

* * *

Nichols Chemical and **National Aniline & Chemical,** affiliates of **Allied Chemical & Dye** are sharing a large new warehouse in East Toronto, Canada.

* * *

American Potash & Chemical has announced formation of a new subsidiary, **San Antonio Chemicals, Inc.,** for which a $750,000 plant has been constructed at San Antonio, Texas.

Located next to another AP&CC subsidiary, **American Lithium Chemicals, Inc.,** the new company will process end liquors resulting from ALC lithium hydroxide manufacturing processes to produce a mixed alkali salt, Alkarb, composed of the metal corbonates of potassium, rubidium, cesium, sodium, and lithium.

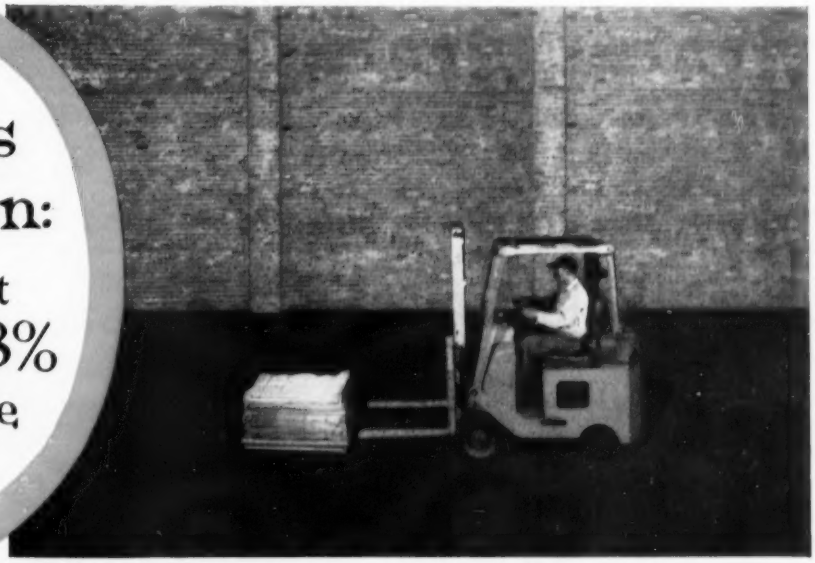
Problem:

Empty containers that hog space

Have you realized how much valuable warehouse space is wasted in storing empty rigid containers? For instance, it takes 480 cubic feet to store enough empty rigid drums for packing 25,000 pounds of chemical fertilizer.

Fulton's Solution:

Bags that give you 98% more usable space



It takes only 11⅓ cubic feet to store 250 empty WPPL (Water Proof Paper Lined) bags, which will hold the same 25,000 pounds of fertilizer. WPPL bags provide moisture control of the packaged product . . . and are economical to pack, handle and ship.

For your package or protection problem . . .
Let our Special Services Division show you how Fulton products can provide the answer. We manufacture a complete line of multiwall paper and textile bags, industrial fabrics and made-up textile items. Write: 1418 Annunciation Street, New Orleans, Louisiana.

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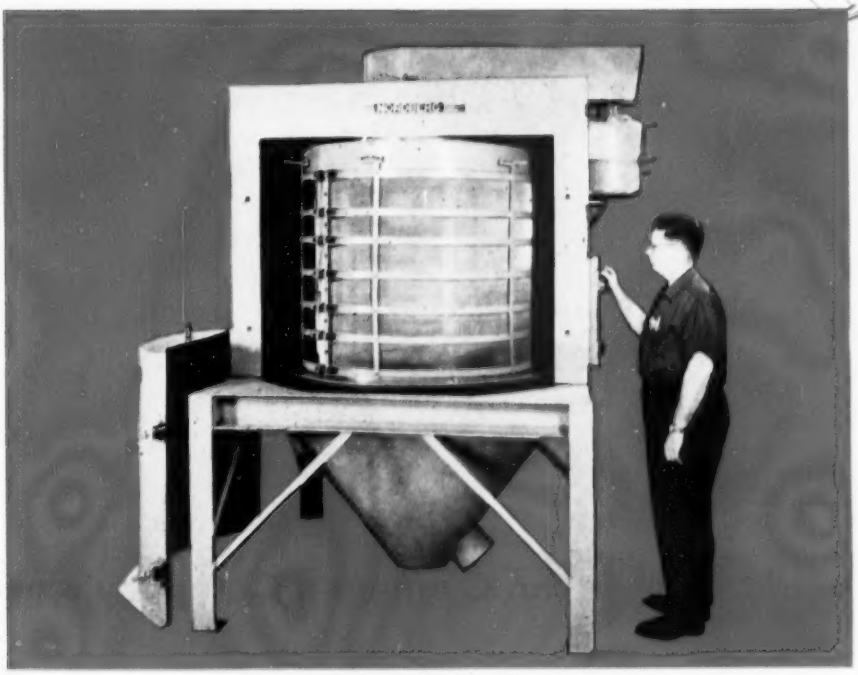

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Laboratory tests show it—more uniform product quality proves it—the Symons V-Screen gives you very high efficiency and large capacity removal of fines. Investigate its application in your plant . . . whether for raw material screening or for assuring a consistently sized finished product.

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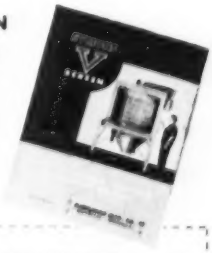

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From BOTH ORES . . . sulphate of potash.

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3. 50 to 52% K_2O Sulphate of Potash for *premium* mixed fertilizers.
4. SUL-PO-MAG (22% K_2O–18% MgO)—premium potash and water-soluble magnesium for *premium* mixed fertilizers.

You can get *all four* of these products, for all your potash needs, from *one source* of supply. Other advantages: uniform quality in every pound; time-saving convenience in ordering and scheduling, and personalized sales and service from experienced people at your nearest district sales office:

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Arcadian® News

Volume 2 | For Manufacturers of Mixed Fertilizers | Number 6

DO YOU NEED EXPERT HELP ON A PRODUCTION PROBLEM?

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Manufacturing fertilizers today is no easy task. New problems keep coming up all the time—problems in ammoniation, formulation, granulation, condition—these and many others. And new products are constantly being developed requiring new methods of operation.

That's why Nitrogen Division, Allied Chemical, maintains a large and well-qualified staff of technologists to provide its customers with expert technical assistance. This staff includes hundreds of fertilizer technicians, scientists and engineers working with millions of dollars worth of laboratory and pilot plant equipment including an electronic computer.

Ready, Willing and Able

When your Nitrogen Division salesman offers to provide you with technical assistance, he is prepared to enlist the aid of a technical service staff larger than the sales force of which he is a member. These men are ready, willing and able to help you find the practical answer to your problem. The accumulated skill of many years of experience augments your own efforts. And this service is available to customers without charge.

These men work on your problem in your plant or in their laboratories using the most modern facilities. They are skilled in ferreting out trouble spots and in recommending new and more economical operating practices. Their aim is to make your plant work efficiently with the least possible adjustment in equipment and personnel. The assistance they give you parallels their extensive and enterprising research in the development of methods and materials to cut costs of producing high-quality pulverized and granular complete fertilizers in plants everywhere.

Entrance to one of the Nitrogen Division Research Laboratories

Nitrogen Division does not sell factory equipment. Nitrogen Division supplies the most complete line of nitrogen products and renders the best available service on the use of nitrogen in fertilizers.

Nitrogen Division technologists originated nitrogen solutions and the profitable practice of ammoniating superphosphate. Through the years this practice has been constantly expanded and improved through new products and processes. Nitrogen Division has also introduced many other changes in industry-wide practices.

Nitrogen Division technical service is not confined to ammoniation problems and fertilizer formulation. Staff men have a thorough knowledge of the entire operation of a fertilizer plant. They often assist in the selection of equipment and in the suggestion of more efficient, money-saving methods all along the production line.

This service is available to Nitrogen Division customers without charge, in the interests of the better use of nitrogen in fertilizers. Get the facts from your Nitrogen Division salesman . . . or contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N.Y. Phone: Hanover 2-7300.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION

FOUR MILLION BABIES A YEAR ARE BUILDING FOOD MARKETS!

At the rate our population is growing, we'll need 25% more crop production by 1975. In the meantime we are losing a million acres of farmland per year to homes, highways and factories. This loss of farmland is barely offset by our increase in irrigation, in draining swamps, and in plowing up permanent grassland. De-salting seawater is too expensive to give us a practical new supply of irrigation water. So our increase in crops must come largely from increased acre yields.

Better Diets

We cannot afford to let the present temporary plateau in crop production blind us to the future. True, we have increased farm production by a tremendous 40% since 1940. In that period our population expanded from 132 million to 170 million, an increase of 29%, and we upgraded our diet, with more eggs, meat, milk, fruits and vegetables, and fewer cereal foods and potatoes. During the war we also shipped much food abroad. Since the war some of our "surplus" has also gone abroad but this is a small percentage of our annual food production.

Population growth will soon demand more food, and we will probably continue our upgraded eating habits. Our population will really boom after 1960. Right now our nation produces four million babies and we lose about one million older persons per year. This is a net gain of three million extra mouths to feed per year. By 1965, when the big baby crops of the 1940's have grown up and start having babies of their own, population will climb even faster. By 1975 we may have 220 million people to feed—50 million more than today.

We are Losing Farmland

By 1975, we can hardly expect to have more good productive land on which to grow crops. Our present loss of a million acres of farmland per year to homes, roads and industry may be speeded up. We will have to farm the land we have better. And that means a fast-growing market for fertilizer, farm machinery, weed killers and other farm chemicals. Some statisticians may point out that several million acres of land have been returned to food production by the decrease in acreage of cotton, tobacco, and feed crops for our fast-disappearing horses and mules. But other millions of acres have been taken out of food production to grow pulpwood and Christmas trees. Even these acres, along with other woodland, will become a market for fertilizer.

Farms are Getting Bigger

We are now using 22 to 23 million tons of fertilizer per year. Good farmers on big farms have been using most of it. The number of farms has been decreasing, while good farmers have been buying more land. That means fewer total prospective customers for fertilizer, but more big customers as farms get bigger. And good farmers will be quick to respond to population pressure that improves markets.

What will an extra three million people eat in a year? They'll eat an extra 270 million pounds of beef, for example. And an extra 235 million pounds of pork, and an extra 540 million quarts of milk. By 1975, 50 million more people in the nation will need 25% more food than we eat now.

If our crop yields per acre should stay the same as in 1951, we would need 150 million more acres of cropland by 1975. We won't have the land. But we will

have enough fertilizer to build these higher crop yields on our present acres.

Now, only 60 per cent of our corn land gets any fertilizer at all, and the average amount of fertilizer per acre on fertilized corn is less than 300 pounds. When we need more corn, fertilizer will grow it! More good farmers will use fertilizer on all their corn crop, at rates of 500 to 1,000 pounds per acre.

Other large-acreage crops get less fertilizer than corn. Only 29 per cent of our wheat acres and 26 per cent of our improved pastures are fertilized. Even with high-value crops like fruits and vegetables, only 68 per cent of the area planted gets commercial fertilizer. There is plenty of room for fertilizer tonnage expansion.

Bigger Yields are Essential

Population growth and the transfer of farm lands to other uses are making it vital that we be prepared to produce more food from each acre cultivated. That would seem to make land more vital to the farmer than ever before. But, as many farm leaders are already pointing out, land is becoming less important in farming. What farmers put into the land is what makes big crops and profits. Land, labor and equipment costs will continue to climb. The basic costs of preparing each acre for growing a crop will go higher and higher. It will take far bigger yields to make each acre pay off. And fertilizer can build these bigger yields at low cost per bushel or pound.

More Profit per Acre

Today a farmer figures he gets a return of $3 to $5 for every $1 he invests in fertilizer. He may not boost this return per dollar very much, as he uses more fertilizer. But he will use more dollars' worth of fertilizer on each acre, to get a bigger crop yield and greater total net profit per acre. We will need more food, and fertilizer can produce it most profitably. Selling fertilizer in the years ahead will be a good and growing business—as well as a service to the nation!

It pays to have TWO Fertilizer Seasons!

For many years production, sales and use of fertilizers have been largely concentrated in one season. The success of a fertilizer manufacturer's entire fiscal year has depended on spring business.

Growth of interest in fall fertilization now offers fertilizer manufacturers a better opportunity to develop a two-season business. This would spread production, sales and deliveries over more months of the year. Although fall fertilizers will never match the tonnage of spring fertilizers, increased use of fertilizers in the fall can mean sounder operations and better profits for the fertilizer man and the farmer.

Farmers are now using fertilizers on a greater variety of crops in the fall. Small grains, pastures and vegetables have always been a good market for fall fertilizers. In recent years this fall market for complete plant foods has been expanding to include other crops. Each year farmers are learning more about the proper use of fall fertilizers. They are discovering time-saving and money-making advantages from fall fertilization of corn and other major crops on many soils.

The Soil is a Warehouse

Most soils are an excellent place to store fertilizer through the winter. Storage of phosphorus and potash in the soil has never been a problem. High-nitrogen fertilizers are also practical for fall use, except on sandy soils in heavy rainfall areas.

More high-nitrogen complete fertilizers are being used in the fall for plowdown with crop residues, and on sod, cover crops and small grains. One of the biggest vegetable farms on the sandy Atlantic Coastal Plain applies all fertilizer but row starter fertilizer on cover crops in the fall. Their agronomists figure that well-fertilized cover crops are equal to one ton of fertilizer plus 10 tons of manure per acre.

Better Crops with Less Labor

Most corn land can profit from fall plowdown of fertilizer, or fall top-dressing of stalks or cover crops. Even on land to be planted to cotton and sugar beets, agronomists recommend fall application of phosphate-potash mixtures, especially with a cover crop. For alfalfa, fall application of fertilizer high in phosphate and potash helps maintain thick stands and profitable yields. Many fruit crops can be fertilized to advantage in the late fall.

Agronomists point out that hayland and pasture in the North should get fertilizer late in the fall so that plant food will be stored in the roots for an early spring start. In the South, oats, wheat, rye and other grazing crops need heavy fall fertilization to provide pasturage plus a profitable grain crop. In other winter grain areas, all the fertilizer can go on in the fall to produce equally as big a crop as split or spring applications would produce.

Labor shortages and high labor costs give every farmer the urge to use machinery and get more jobs done at other times than during the spring rush. Fall, with dry ground and slack time, is an ideal season to spread fertilizer by truck and other simple, fast, low-cost methods.

A 200-Million-Acre Potential

Many leading farmers are now using fall fertilizers with outstanding success. Expansion of this practice to other thousands of farms will make the fertilizer business more of a two-season business.

The corn, small grains, vegetables, fruit, pasture and hay crops now grown on soils adapted to fall fertilization represent a potential market of more than 200 million acres. Start now to get a bigger share of this market by aggressive promotion of fall fertilizers.

Fertilizer manufacturers now have a better opportunity to develop more fall business.

NITROGEN *plus* SERVICE

There are many reasons why it pays you to deal with Nitrogen Division, Allied Chemical. You are served by America's leading producer of the most complete line of nitrogen products. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions for the fertilizer industry. You are assured of dependable supplies from three huge plants at Hopewell, Ironton, and Omaha. Your nitrogen is delivered to you by the best transportation facilities and equipment. You get technical assistance and formulation advice from the largest and most efficient staff of nitrogen experts. Your sales are supported by the most powerful advertising campaign ever conducted to sell fertilizers. Nitrogen Division is your headquarters for NITROGEN *plus* SERVICE. Look over the big line and contact one of the 14 offices listed below.

Arcadian® Nitrogen Solutions

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®								
2	41.0	22.2	65.0	—	12.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	1.147	18	26
3	41.0	26.3	55.5	—	18.2	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	1.194	7	61
6	49.0	34.0	60.0	—	6.0	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	1.134	22	1
URANA®								
10	44.4	24.5	56.0	10.0	9.5	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	1.052	29	1
U-A-5®								
A	45.4	36.8	—	32.5	30.7	0.925	57	16
B	45.3	30.6	—	43.1	26.3	0.972	48	46
[illegible]	82.2	99.9	—	—	—	0.618	211	—

Other ARCADIAN® Nitrogen Products: UREA 45 • A-N-L® Nitrogen Fertilizer Ammonium Nitrate • American Nitrate of Soda • Sulphate of Ammonia

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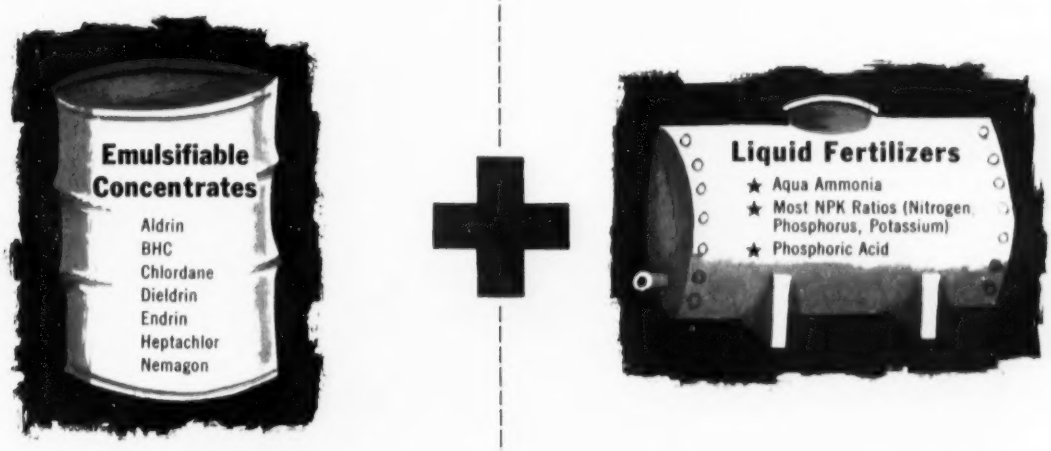

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Further advantages of this novel system:

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PHOSPHATE MINES AND PLANTS IN FLORIDA AT NORALYN, PEACE VALLEY, ACHAN, MULBERRY; IN TENNESSEE AT MT. PLEASANT, WALES AND GODWIN

MARKETS

ORGANICS: Supply and demand of organic ammoniates for fertilizer use continue in good balance with demand particularly active at present in the Florida area. Prices through May continue at previous levels with Leather Nitroenous Tankage at around $3.25 per unit of Ammonia f.o.b. production point. One Leather Nitrogenous producer recently announced prices for the new season at $2.75 per unit of Ammonia for June through September shipment; $3.00 for October through December and $3.25 for January forward shipment f.o.b. midwestern production point.

Activated Sludge prices continue at previous levels of $2.95 per unit of Ammonia and 50 cents per unit of APA, bulk, f.o.b. at a Midwest production point, with another production in the Southwest priced at $3.00 per unit of Nitrogen and 50 cents per unit of APA, bulk.

CASTOR POMACE: Current production of domestic Castor Pomace is extremely limited and the one producer in the northeast is not officially offering any tonnage. Shipments are against previous contracts and price is nominally $45.50 per ton in bags f.o.b. New Jersey shipping point.

DRIED BLOOD: Unground, sacked, in the New York market price currently at around $5.00 per unit of Ammonia and in the Chicago market around $6.00.

POTASH: One domestic producer recently announced graduated prices for the new season on Muriate of Potash as follows: 34½ cents per unit K_2O for July, 35 cents August, 35½ cents September, 36 cents October, 36½ cents November through April, 36 cents May, 1958 and 34 cents June 1958. Another producer indicates a 36 cents per unit K_2O basis for the entire season. Both price schedules are f.o.b. Carlsbad, New Mexico, bulk carlots.

GROUND COTTON BUR ASH: Demand and supply of this source of Potash, primarily in the form of Carbonate of Potash, continues in good balance. Current analyses are running about 38/40% K_2O and the delivered cost compares with Sulphate of Potash for most areas.

SUPERPHOSPHATE: Demand is beginning to taper off as the season approaches an end but prices remain steady and one large producer in the southeast has advanced price on normal Superphosphate at several of its origin points.

PHOSPHATE ROCK: Supply and demand seem to be in good balance and prices recently have advanced on account of increased oil and labor costs.

CALCIUM AMMONIUM NITRATE: Prices of this direct application 20½% Nitrogen product continue unchanged at $44.00 per ton in bulk and $48.00 per ton bagged f.o.b. at an Eastern Seaboard production point and usual Atlantic/Gulf ports.

AMMONIUM NITRATE: Demand for this 33½% direct application and mixing grade form of Nitrogen is currently exceeding the supply. Shortage may last for several weeks as one or two manufacturers are having mechanical difficulties at their plants and others are shipping directly from production.

GENERAL: Demand for mixed fertilizers in the Carolinas and Georgia is tapering off, but in other areas the season is maintaining good volume of demand. Soil Bank Program continues to adversely affect the consumption of mixed fertilizers in several states in the southeast.

INDUSTRY CALENDAR

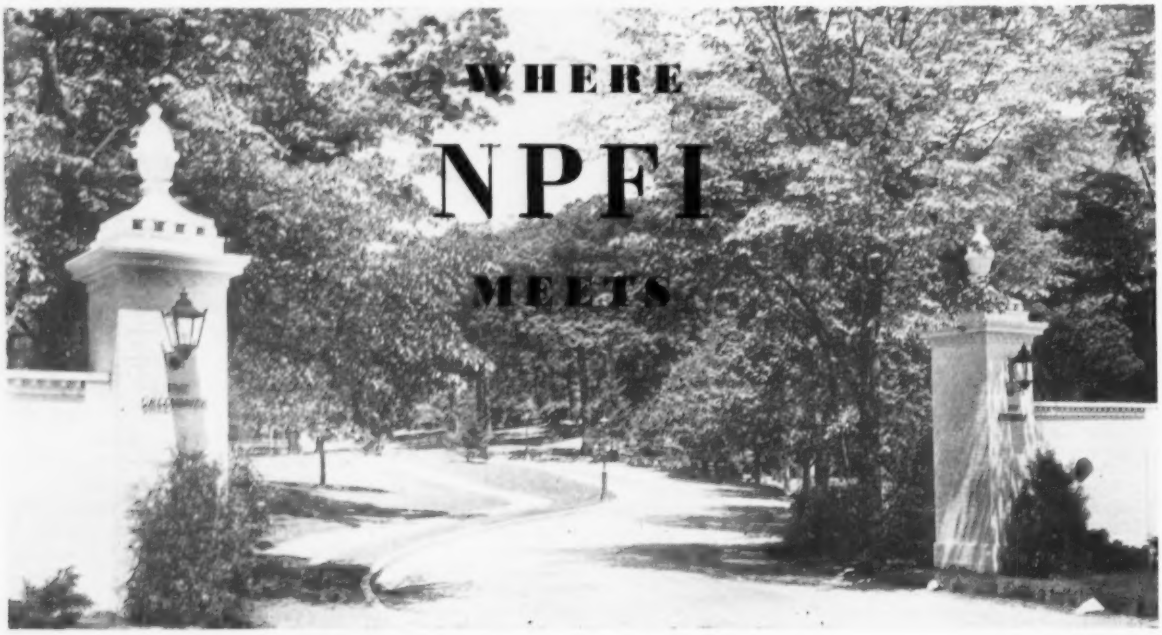
Date	Organization	Place	City
June 9-12	Nat'l Plant Food Inst.	The Greenbrier	White Sulphur Springs, W. Va.
June 17-19	Sou. Control Officials	Dinkler-Tutwiler	Birmingham, Ala.
June 18-20	New Fert. Processes Demo.	TVA Pilot Pant	Wilson Dam, Ala.
June 26-28	Pacific N.W. Fert. Conf.	Benson Hotel	Portland, Oreg.
July 10-14	Plant Food Producers of Eastern Canada	Manoir Richelieu	Murray Bay
July 18-19	SW Fert. Conf.	Buccaneer Hotel	Galveston, Texas
Oct. 3-5	Pacific N.W. Plant Food		Sun Valley, Ida.
Oct. 17	Chem. Control Procedures	Shoreham	Washington, D.C.
Nov. 3-5	Calif. Fert. Assn.	St. Francis	San Francisco
Nov. 6-8	Fert. Indus. Round Table	Sheraton Park	Washington, D.C.
Dec. 11-13	Ag. Ammonia Inst.	Marion Hotel	Little Rock, Ark.
	1958		
Jan. 7-8	Texas Fert. Conf.	Memorial Center	College Station
Feb. 13-14	MidWest Soil Imp.	Edgewater Beach	Chicago, Ill.

CF Staff-Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

	April		March		Jan.-Mar. Qtr.		July-December		January-June		YEAR (July-June)	
STATE	1957	1956	1957	1956	1957	1956	1956	1955	1956	1955	1955-56	1954-55
Alabama		312,676[1]	196,033	246,535	291,118	347,956	174,707	165,867	813,104	846,735	1,029,030	1,114,238
Arkansas		90,923[1]	74,693	92,726	120,899	141,981	59,915	60,299	299,172	270,894	359,471	330,781
Georgia	322,144	343,425	140,374	133,176	221,375	216,862	253,559	250,968	993,954	1,047,875	1,244,422	1,273,445
Kentucky		105,564[1]		77,228[1]		168,371[1]	90,284	91,478	441,481	431,024	529,600	522,410
Louisiana	48,929	67,269	45,682	57,828	82,709	93,469	71,129	59,345	214,343	232,781	273,688	310,848
Missouri	60,716	100,039	141,780	133,176	219,689	235,254	331,343	356,241	450,102	414,503	804,441	682,690
N. Carolina		418,843[1]	314,179	417,258	534,774	581,897	216,234	225,182	1,424,267	1,566,158	1,649,449	1,830,633
Oklahoma		13,969[1]	15,308	18,749	27,868	31,884	54,509	69,542	65,854	63,799	135,396	122,204
S. Carolina	199,381	169,465	233,862	286,994	393,741	452,619	122,929	119,947	743,670	796,111	863,617	928,715
Tennessee	86,741	97,059	29,825	33,783	48,649	50,736	165,796	154,260	378,676	355,965	515,551	523,349
Texas	72,506	77,188	100,795	101,164	205,547	180,802	202,406	193,704	377,805	375,176	566,399	588,062
California		(reports compiled quarterly)			264,270	280,853	412,747	361,615	639,377	603,657	1,001,554	922,127
Virginia		(reports compiled quarterly)			277,124	273,642	154,075	162,709	599,111	636,585	761,820	795,770
Indiana			(reports compiled semi-annually)				305,939	255,131	837,918	873,966	1,063,049	1,158,960
Iowa			(reports compiled semi-annually)				85,147	130,000	315,329[1]		445,329[1]	
Michigan			(reports compiled semi-annually)						443,908[1]			
New Hampshire			(reports compiled semi-annually)				3,253[1]		13,168[1]			
Washington			(reports compiled semi-annually)				55,709	48,749	103,885	124,186	152,674	182,348
Connecticut			(report issued annually)								76,660	84,494
Oregon			(report issued annually)				124,294[1]		241,742[1]			
TOTAL	790,417	854,445	1,292,531	1,533,702	2,687,763	2,887,955	2,756,428	2,705,037	8,352,719	8,639,506	11,026,821	11,371,074

..... (not yet reported) * Not compiled [1] Omitted from column total to allow comparison with some period of current year.



INSTITUTE MEETS JUNE 9-12 AT GREENBRIER

When President C. T. Prindeville raps the gavel for the Monday opening session of the National Plant Food Institute this year he will launch a program that bids fair to be a searching inquiry into the scope of the present fertilizer market—and how to widen and deepen it. In a year when the farmer is learning a valuable lesson in making less land produce more crop, this is excellent programming. So it is fully expected that this will be an outstanding meeting of our industry, with a good thousand in attendance—and in eager attendance at the serious sessions, as well as the social events which follow.

The panel on Monday offers a list of fine names to supply a thoroughly diversified approach to the subject: How big is the Fertilizer market? As moderator and speaker from the bankers viewpoint there is O. E. Anderson, who is secretary of an association which has played a big part in the development of its farmer neighbors, the Ohio Bankers Association. E. T. York, Jr., whose right to speak on "From the Soil and Crop Standpoint" is well established by his position as Northeast Manager of the American Potash Institute.

Gordon B. Nance, who will discuss the question from the economic standpoint, is professor, department of Agricultural Economics, University of Missouri. And an outstanding farmer whose own practical performance entitles him to represent his kind will speak on the farmer's standpoint. He is Wilbur Renk, of Wisconsin.

The logical follow-up to this multifaceted panel discussion, because it

They Head NPFI

PRINDEVILLE

COLEMAN

TRUITT

will raise many questions that can best be answered by the top echelon of the Institute itself, is the talk by Dr. Russell Coleman, executive vice-president of the Institute who will discuss the ways and means by which the Institute can help expand the fertilizer market. Coming from a man who, in his own way has already contributed a great deal to the growth of the industry during the past decade or so, this should be an equally valuable contribution to the session.

The annual business meeting will follow, and will complete the morning's work for those not on the Research and Education Committee. This will meet during the afternoon and the three division chairmen will make their annual reports. They are Agronomy and Horticulture, Fertilizer Technology, and Economics and Farm Management. Secretary of the meeting is the Institute's chief agronomist, Dr. W. H. Garman.

For the remainder of the delegates there is entertainment. A special program for the ladies. The hospitality hour at which the nitrogen producers will be hosts to all.

Other recreation, as always, includes a men's golf tournament, tennis tournament, horseshoe pitching, bridge and canasta for the ladies.

The general session Tuesday, over which Mr. Prindeville will also preside, is featured by a talk from Senator Karl E. Mundt of South Dakota. To the general public he may be best remembered as a leading figure in the McCarthy - Army televised hearing. But to those of us in the industry, and to farmers all across the nation it is more important as a member of the Senate committee on Agriculture and Forestry. And as such what he has to say will be listened to with special interest at this time.

SENATOR MUNDT

Preceding the Senator will be a discussion of the current economic outlook for business, by Raymond Rodgers, who is professor of banking, Graduate School of Business, New York University. The standing of this great institution, and the place Professor Rodgers holds in it, establish the level of this contribution to the final business session.

As always, there will be a presentation of scrolls to editors in the agricultural field, which will be presented to the winners by Mr. Prindeville. As our readers know the editors are divided into 2 classes —those who edit farm magazines of more than 300,000 circulation, and those with less than this circulation figure. From each group one is chosen to be honored for his contribution, as viewed by the NPFI judges, to the field of agriculture.

That will complete the Tuesday session, and the afternoon will be free for recreation and enjoyment of the many special facilities of The Greenbrier. And that evening, following a hospitality hour by the potash producers, will be the annual banquet.

GARMAN

RODGERS

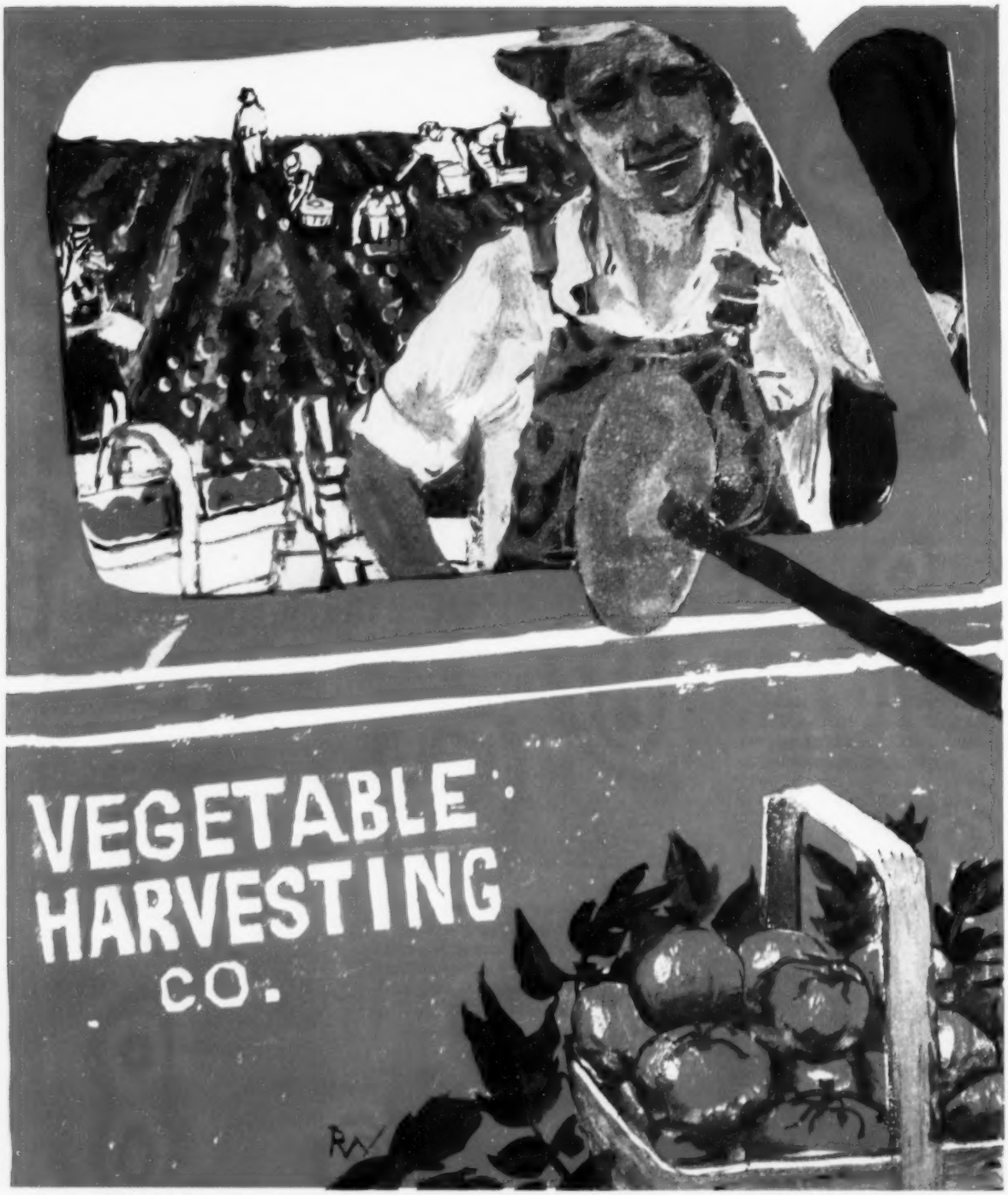
PANELISTS

ANDERSON

YORK

NANCE

RENK



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$90,000,000 RESEARCH JACKPOT

It surprised Florida farmers to learn that a single research discovery has brought three times as much money to the state as has been appropriated to the Experiment Stations in their entire history!

by Dr. J. R. Beckenbach, *Director*
Florida Agricultural Experiment Stations

It is almost impossible to clearly evaluate research in agriculture. The research brings no returns until it is used. The farmer's contribution in management and capital is so great that it is usually impossible to isolate the effect, in terms of dollar value, of any research contribution which he may adopt and put into practice.

However, the example which I cite below is one of the very few cases in which a clear-cut financial picture of the value of our research can be isolated from other cost factors and from contributions made by other agencies, or even the grower.

I shall deal with the net value to Florida of a single research contribution by the Agricultural Experiment Stations.

The discovery—in the mid-1930's—of the need for certain secondary and minor elements in citrus production is still yielding measurable results—illustrated here in graphic and tabular form. In the figure, total citrus yields for Florida, by years, from the 1920-21 season through the 1954-55 season, are shown.

The production curve shows two general trends during the past 35 years. The first occurs during the period from 1920 through about 1935. Then the citrus fertilization program was based largely on organic and inorganic materials and fertilizer mixtures containing chiefly only nitrogen, phosphorus and potassium.

This program led to widespread deficiencies of magnesium, manganese, zinc and copper and severely limited production. Through research by Agricultural Experiment Stations workers, chiefly at the Citrus Station, the deficiencies were identified, the symptoms were described and a nutritional program was worked out for their correction. Equally important were the fertilizer and cultural programs developed to prevent the recurrence of these deficiencies.

These research findings were quickly accepted by the industry. As a result, Florida now is the largest citrus-producing area in the world.

The differential between the production which was actually achieved following the use of minor elements and that which could have been expected had not research work been successfully accomplished is shown graphically in the figure and has been partly tabulated in the table. The use of minor elements in citrus production in Florida was becoming general by 1937, and the production differential resulting from this research has therefore been projected from 1937 to the 1954-55 season.

Estimated Production[1] Differential as Affected by the Minor Element Nutritional Program for Citrus

Year	Estimated Box[2] Differential (Millions)	Estimated Dollar[3] Value Differential (On-Tree Price)
1940-41	17.5	$10,500,000.00
1945-46	39.0	73,710,000.00
1950-51	62.0	88,040,000.00
1954-55	81.0	91,530,000.00

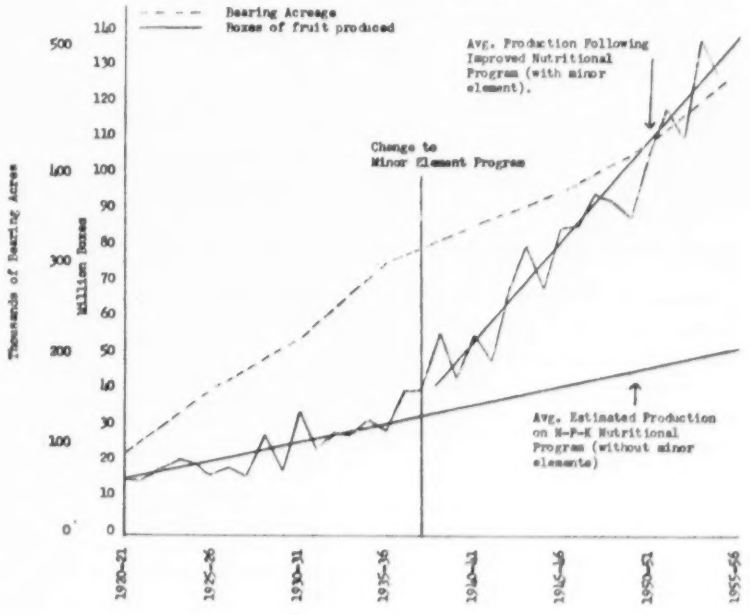
[1]Production data obtained from Florida Citrus Fruit Annual Summary—1955, Florida Crop and Livestock Reporting Service, Orlando, Florida.
[2]Based on average production differential projected in attached figure.
[3]Weighted average based on orange, grapefruit and tangerine production and prices for years in question.

An estimated dollar value of this production differential, based on weighted average "on-tree" prices for the years in question, is shown in the table.

It is a most significant fact that in the 1954-55 season alone, for example, the dollar value of the estimated effect of this single Experiment Station research accomplishment—$91,530,000—exceeded by almost three times all of the State General Revenue funds—$35,201,855—ever appropriated to the Florida Agricultural Experiment Station during its entire history!

The only added expense chargeable against this dollar value figure is the cost of minor elements themselves, and this is a small figure. Since the minor elements are incorporated into fertilizers and sprays

Effect of Use of Minor Elements on Florida Citrus Production, 1920-21 - 1955-56



which must be used in any event, no extra labor or special machinery is required and the contribution of this research is clear-cut.

The above example is one of thousands of research contributions, large and small, made by Station research personnel. There is no agricultural enterprise in Florida that has not benefited from these researches, and Florida's agriculture is a living tribute to research put into practice by the progressive farmers and ranchers of our state.

FERTILIZER BIG FACTOR AS FLORIDA DOUBLES CITRUS YIELD

The number of boxes of oranges and grapefruit harvested per acre in Florida has more than doubled, a 25-year study by the Florida Agricultural Extension Service and Experiment Stations shows.

Zach Savage, station economist, says that less than 200 boxes per acre were picked before 1942. Since then, average harvests ranged from 224 boxes in 1944-45, when a hurricane damaged the crop, to 447 in 1953-54.

Since 1931, the Experiment Stations and Extension Service have cooperated with growers in conducting a citrus costs and returns study. It includes an average of 243 groves.

For the 23 seasons grapefruit trees constituted 31 percent of the groves over 10 years old. The average of groves in 1953-54 was 30 years, or two years older than in 1950-51 and 13 years older than in 1933-34.

Reasons for the increase in number of boxes harvested per acre: increase in average size of trees, better fertilization, larger proportion of fruit harvested because of good prices, and development of fruit processing.

Soil enrichment has cost the orange and grapefruit grower about 36 cents out of every dollar of operating expense. This average figure was calculated over a 24-year period.

Savage reports, however, there's been a wide range in seasonal costs of fertilizer from 1931 to 1955. The lowest fertilizer cost per acre was in 1933-34, $17.74. The highest was in the 1954-55 season, $66.43.

Fertilizer ranks second only to labor, power and equipment costs. Savage said money spent per acre for materials added to the soil increased about 160 percent over the period covered by the citrus cost accounts. The information was collected from 210 grove operators cooperating with county agents of the Florida Extension Service.

Price of fertilizer—it increased 50 percent from 1932 to 1956—was not the only reason for the rising cost to the grower. He has been using more fertilizer to get higher yields, and has been using fertilizers with larger amounts of the common elements and a larger number of elements.

Fertilizer costs per box ranged from a high of 22 cents in 1931-32 to a low of 11 cents in 1939-40 and 1940-41.

From Agricultural News Service *(publication of Univ. of Fla., College of Agriculture)*

NPFI Sponsors Oct.-Nov. Meetings

October 17, 1957: A Conference on Chemical Control Procedures at the Shoreham Hotel, Washington, D. C., for industry chemical control analysts, sponsored by the National Plant Food Institute.

November 6-7-8: Fertilizer Industry Round Table at the Sheraton Park Hotel, Washington, D. C., for operating personnel of the fertilizer industry.

RESEARCH VS SURPLUS

The President's Commission on Increased Industrial Use of Agricultural Products believes that a greatly expanded research program is the answer to crop surplus.

GARDEN GOLD

The garden field, estimated now at the $4,000,000,000 level, is steadily climbing. Factory landscaping, a not inconsiderable part of this market, alone accounts for $70,000,000 annually. Fertilizer is a big factor in what is really a new market, brought on by shorter work hours.

Dr. Russell Coleman admiringly views the American Public Relations Association's Silver Anvil Trophy awarded the Institute in the field of agriculture as highest honor in the field of public relations.

NPFI Honored By Public Relations Group

The National Plant Food Institute has received the American Public Relations Association's Silver Anvil Trophy in the field of agriculture, the highest honor in the field of public relations.

Dr. Russell Coleman, executive vice president of the Institute, accepted the award at the Annual Awards Dinner of the American Public Relations Association as the climax of its Thirteenth National Conference in Philadelphia.

Seventeen Silver Anvil Trophies were presented "for the most outstanding public relations achievement programs of firms and organizations in eighteen classifications."

NPFI's entry in the Association's competition featured their extensive program of cooperation between bankers, land-grant colleges, and the Institute in mutual concern for the problems of maintaining, replenishing, and increasing the fertility of the nation's soils.

Dr. Coleman paid tribute to the banking and land-grant college leaders in the twenty states cooperating in the projects which won the award.

"Many individuals and organizations too numerous to list have assisted in these projects which have resulted in the recognition given the Institute," he said. "Projects involved in the Institute's entry could only have been successful because of the tremendous interest and efforts on behalf of agriculture by the respective bankers' associations and the land-grant college personnel."

New Research Service

Improved Processing Techniques Are Being Developed By Spencer Chemical Company:

Fertilizer manufacturers will benefit from new pilot fertilizer-mixing plant now at work

WOULD you like to be able to produce higher analysis mixed fertilizer with low-cost raw materials . . . lower your production costs . . . improve physical properties and mechanical condition of your mixed fertilizer?

To help fertilizer manufacturers do these things, and many more, Spencer Chemical Company of Kansas City, Missouri, producer of SPENSOL Ammoniating solutions, has constructed a pilot fertilizer mixing plant at the company's Jayhawk Works near Pittsburg, Kansas.

Another Spencer First

Since Spencer does not produce mixed fertilizer, the plant will be used solely for research work to develop improved mixed fertilizer processes.

Spencer is the first basic raw materials supplier to offer this service to fertilizer manufacturers.

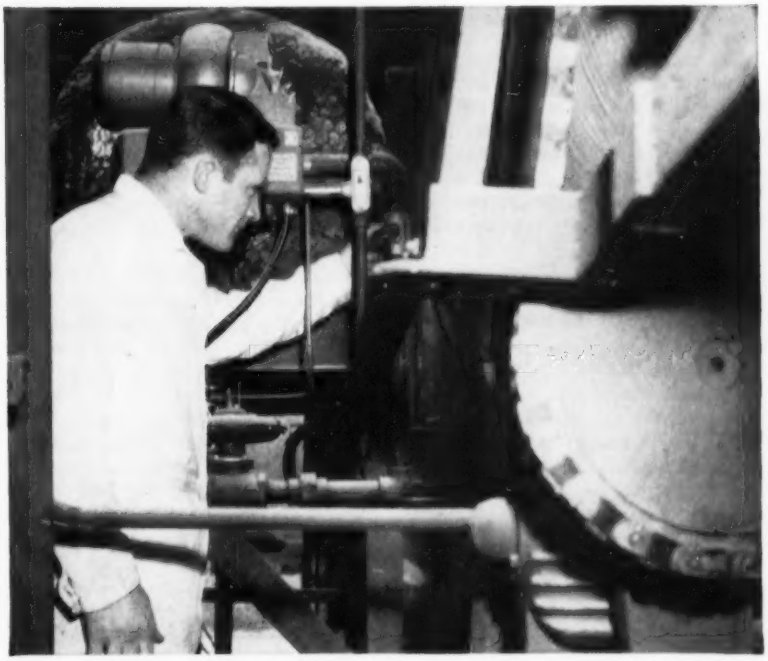
Long a producer of Nitrogen materials for the fertilizer industry, Spencer Chemical Company has a major interest in the future of the industry, and wants to help manufacturers find ways to produce the best possible product in the most efficient way.

The results of all research will be made available to fertilizer manufacturers through demonstrations and printed reports.

The information will be supplied free of charge by Spencer's Agricultural Chemical Technical Service Department.

Whether or not you, as a fertilizer manufacturer, use SPENSOL in producing mixed fertilizer, you can receive reports on the results of tests as they are performed by writing:

Spencer Chemical Company, Agricultural Technical Service, Dwight Bldg., Kansas City 5, Missouri.



Part of the equipment in the new Spencer pilot plant, which can use any commercially available raw materials and produce any analysis that is chemically feasible. (See story at left.)

SPENCER CHEMICAL COMPANY, Dwight Bldg., Kansas City 5, Mo. District Sales Offices: 412 Candler Bldg., Atlanta, Ga.; First National Bank Bldg., Chicago, Ill.; Union Planters National Bank Bldg., Memphis, Tenn.

proper soil condition necessary for efficient use of

AMMONIACAL NITROGEN FERTILIZERS

WILLIAM G. BLUE *and* CHARLES F. ENO
Associate Biochemist and Associate Soil Microbiologist, Florida AES

The initial product of industrial synthesis of atmospheric nitrogen into fertilizer materials is the reduced, ammoniacal form of nitrogen, anhydrous ammonia. Other ammoniacal forms, such as urea and ammonium sulfate, are easily produced. The reduced nitrogen forms have become widely used as fertilizers. However, ammoniacal nitrogen is not readily utilized by many crop plants. Nitrate nitrogen, the oxidized form, is needed also. Nitrification, the soil process whereby ammonia is converted to nitrate by micro-organisms, is carried on at a sufficiently rapid rate in fertile soils for most crops. Under proper conditions, the reduced forms may frequently be used at a considerable savings for field crops and pastures.

Many nitrogen-source experiments have shown that, pound for pound, nitrogen from most sources gives about the same results. However, there are conditions where this is not true. On the whole, it appears that if an economic advantage is to be gained by the use of the less expensive ammoniacal nitrogen sources, more careful soil management will be necessary.

Though some crop plants are able to absorb ammoniacal nitrogen, the largest amount of absorption is in the nitrate form. The absorption of ammonia by plants where nitrate nitrogen is inadequate may cause nutritional disorders. "Nutritional leaf roll" in potatoes and other related plants and magnesium deficiency in oats on light, sandy, ridge soils have been observed where poor soil conditions prevented proper conversion of ammoniacal nitrogen.

To insure that ammoniacal nitrogen fertilizers give results comparable to those obtained from fertilizers containing nitrate nitrogen, it is essential that the soil be managed in such manner that nitrification occurs at a good rate. The primary cause for poor nitrification in Florida soils is excessive acidity and, in some cases, a long-standing low fertility level.

Experiments have shown that the process of nitrification proceeds very slowly when the soil reaction is about pH 5 or below (see chart). Nitrification improves rapidly as the soil pH is increased by the use of lime. The maximum rate of nitrification occurs at about pH 8.0, but it is sufficiently rapid at about pH 6.0 to supply adequate quantities of nitrate nitrogen for most field crops and pastures. It is not necessary to "over-lime" to provide a suitable condition for good nitrification.

In experimental work results from ammoniacal nitrogen fertilizers have been comparatively poor where the initial soil reaction was below pH 5.5 and no lime was applied. For example, on an acid unlimed soil, yields of pearlmillet were increased by about 3,000 pounds dry weight per acre where 100 pounds of nitrogen per acre were applied as ammonium nitrate, but the increase was only about 1,500 pounds per acre where the ammoniacal source, anhydrous ammonia, was used (Table 1). In other words, the yield increase was two times as large where nitrate nitrogen was applied. If one considers the percentage of applied nitrogen recovered in the forage, only 32 per cent was recovered where anhydrous ammonia was used, 50 percent for urea, and 74 percent for ammonium nitrate. About 2½ times as much nitrogen was recovered from ammonium nitrate as from anhydrous ammonia. All data secured from this experiment indicate that the primary reason for poor response to the ammoniacal nitrogen was a low soil reaction.

Results from ammoniacal fertilizers have been relatively better where the soil PH was higher (Table 2.) There were no real yield differences among three sources—anhydrous ammonia, sodium nitrate, and ammonium nitrate. However, the percentage of the applied nitrogen recovered in the forage was still considerably lower where anhydrous ammonia was used. This resulted from a low average content of protein nitrogen in the forage. Even in this study, the soil pH was probably too low for optimum conversion of ammonia to nitrate.

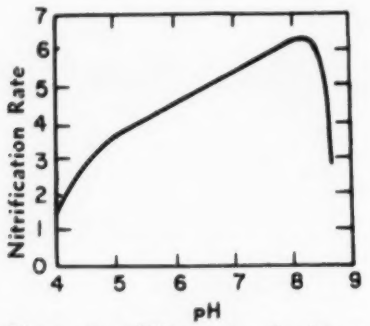


Figure 1.—Effect of soil pH on the rate of Nitrification. (From Waksman's text.)

Certainly all Florida soils are not in the excessively acid range, but results from all soil samples sent to the Soil Testing Laboratory show that over 40 percent of them had reactions below pH 5.5 and over 66 percent were below pH 6.0. About two-thirds of Florida soils, according to these figures, would benefit from the addition of some lime. Results from soils used only for field crops and pastures would probably show that these figures are conservative estimates of our needs for lime.

In conclusion, if you anticipate using ammoniacal nitrogen fertilizers, you should make sure that excessive soil acidity does not spoil the chance of obtaining good results. Soil samples should be taken for pH determination according to the recommended procedure. Samples may be sent to your State Soil test service. If lime is applied according to recommendations, the response from ammoniacal nitrogen fertilizers will be greatly improved.

TABLE 1.—Yields of Oven-Dry Pearlmillet Forage and the Percentage Protein and Percentage of the Applied Nitrogen Recovered in the Forage on Soil Having a pH of 5.0.

Treatment*	Yield Lbs./A.	Average Percentage Protein in Forage	Percentage of Applied Nitrogen Recovered
Check	3,800	10.3	0
Anhydrous ammonia	5,090	11.6	32
Urea	5,950	11.8	49
Ammonium nitrate	6,200	13.8	74

*The three sources of nitrogen were applied at 100 pounds per acre of nitrogen.

TABLE 2.—Yields of Oven-Dry Pensacola Bahiagrass Forage and the Percentage Protein and Percentage of the Applied Nitrogen Recovered in the Forage on Soil Having a pH of 5.6.

Treatment*	Yield Lbs./A.	Average Percentage Protein in Forage	Percentage of Applied Nitrogen Recovered
Check	1,260	5.4	0
Anhydrous ammonia	4,570	6.7	39
Sodium nitrate	4,930	9.0	60
Ammonium nitrate	5,160	7.7	53

*The three sources of nitrogen were applied at 100 pounds per acre of nitrogen.

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- ANHYDROUS AMMONIA
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- Years of experience and know-how go into each run of Phillips *66* chemical fertilizer materials.
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Phillips 66

BORON ADDITIONS to liquid fertilizers

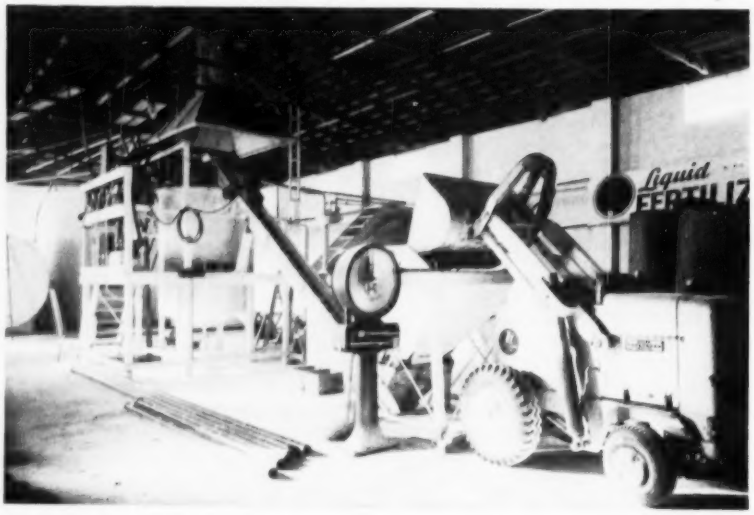
by T. R. Fisher *and* C. K. McIntyre, Jr., *United States Borax & Chemical Corp.*

A relatively new development in the fertilizer industry is the growing widespread manufacture and field use of mixed liquid fertilizers. Generally the liquid fertilizers have consisted of only the major plant nutrients: nitrogen, phosphorous, and potash. Since continuing research in soils and plant nutrition is showing more and more soil areas to be deficient in one or more of the trace elements (such as boron), there has been an increasing interest in the possibilities offered by the inclusion of trace elements in fertilizers in addition to the major plant nutrients. POLYBOR-2 has been found to be an efficient borate additive for liquid fertilizer compositions.

The eastern half of the United States, provinces of Canada, and the Pacific Northwest have extensive areas deficient in boron. The field crops most commonly found deficient in boron are alfalfa, clovers, and more recently some indications in field corn in certain areas. The list of vegetable and fruit crops often found boron deficient is quite extensive and includes such crops as apples, citrus, pears, beets, cauliflower, broccoli, carrots, celery, turnips, and others. Because of the nature of boron deficiency injury, most of the fruit and vegetable crops are made unmarketable when the deficiency occurs.

The correction of boron deficiency is best achieved by adding borates or other boron carriers to fertilizers being used on these crops. The amounts of boron needed vary depending upon the soil and crop needs but generally fall within a range of 10 to 40 pounds of borax equivalent per acre. An addition of 10 to 100 pounds of borax equivalent per ton of fertilizer (.5% to 5%) normally supplies that amount needed. For a number of years this has been a common practice in the solid fertilizer industry. Fertilizer borates are relatively inexpensive with a cost to the farmer ranging from $0.25 to $1.50 per acre.

As a result of the growing liquid fertilizer industry, a need was seen to conduct studies designed to obtain additional information on the feasibility and effects of adding boron to standard liquid fertilizer formulations. The first requirement of a boron carrier to be used for this purpose is complete and ready solubility. The properties of major interest in formulations of liquid fertilizer which might be altered by borate additions are crystallization temperature, pH, and density.



Interior view of liquid fertilizer mixing plant.
(Photo courtesy of CDK Liquid Fertilizer Corp., Liberty, Ind.)

The formulations of boron-containing liquid fertilizers most likely to be used are determined by the rate per acre application of boron needed and the rate per acre application of the borated liquid fertilizer desired. The formulations may vary so as to be adaptable to any soil area and its needs. For the purpose of this study eight standard liquid fertilizer formulations were selected for laboratory study with two boron carriers; borax and POLYBOR-2; at three levels of borate concentration corresponding to 2.5%, 5.0%, and 7.5% borax equivalent. Borax has been used for many years as a boron carrier in solid fertilizers and is quite familiar to the industry. POLYBOR-2 is a partially dehydrated homogeneous combination of sodium pentaborate and sodium tetraborate which is highly soluble and contains 66% B_2O_3 (181% borax equivalent). It has been used extensively as a spray or dust for the correction of boron deficiency on many crops.

Liquid fertilizers are prepared either by dissolving the desired components as salts in water, or by neutralizing phosphoric acid solutions with ammonia. In most cases equivalent results are obtained with either method unless relatively large amounts of inert salts are present as in some of the dissolved salt compositions.

Basic test solutions or formulations were prepared by dissolution of monoammonium phosphate, diammonium phosphate, urea, and potassium chloride in water in varying proportions to obtain the formulations corresponding to 9-9-9, 5-10-10, 10-5-5, 5-10-5, 10-10-5, 12-8-4, 3-9-9, and 8-24-0. Borate was added to these basic solutions in the forms and concentrations listed. In order to maintain the nutrient concentration of the solutions equal to that of the basic solutions not containing borate, the amount of water used was reduced by the amount of borate added. No attempt was made to include any type of special salting-out inhibitor. The constituent salts were weighed into a beaker and brought to 100 gm. total of solution by the addition of water. The solu-

tions were heated to 80° F. and stirred to effect dissolution.

As these liquid fertilizer systems are complex mixtures with a wide variety of crystalline phases possible and a great tendency to supersaturate, it was not possible to obtain reproducible crystallization temperatures simply by cooling the solutions in a low temperature bath and watching for the appearance of crystals by some method such as an increase in the Tyndall effect. Crystallization temperature ranges were obtained by holding the solutions at successively lower temperatures from 35°F. to 10°F. in 5° or 10° increments or until crystallization was observed. Solutions remaining clear after a minimum of four hours at any given temperature were seeded with the starting salts and with the crystalline products obtained from the same and other solutions at lower temperatures to eliminate the possibility of supersaturation. The solutions giving crystals in the various temperature ranges are listed in Table I, and solution densities at 70°F. are listed in Table II. The pH values reported in Table III were determined at 70°F. on solutions of nine parts distilled water plus one part fertilizer solution.

From Table I it can be noted that POLYBOR-2 had the least effect on crystallization temperatures. At 2.78% POLYBOR-2 concentration (5% borax equivalent) all solutions had crystallization temperatures below 35°F. and five of the eight below 25°F. Borax had a much greater effect on crystallization temperatures at 5.0% concentration as crystallization occurred in all eight solutions above 35°F. POLYBOR-2 at the concentration of 4.14% (7.5% borax equivalent) was found to raise crystallization temperatures of six of the solutions above 35°F. All crystallization temperatures were found to be below room temperature, but no general correlation was apparent on the basis of fertilizer composition.

The densities of the solutions were found to increase slightly on the addition of the borates with a maximum increase of approximately 5% for an addition of 7.5% borax. POLYBOR-2 additions were found to have a slightly smaller effect than borax.

The highest pH values observed for the maximum borate additions were obtained with borax and were about 7.8 pH units. POLYBOR-2 showed only a slight increase of up to about 0.5 pH unit over the pH values obtained for the basic compositions. The lowest pH values obtained were in the range of 6.8. Although the pH values and densities were not obtained on every solution studied from the values listed a sufficiently accurate extrapolation to obtain the other values can be made, and all values will fall within acceptable limits. No ammonia was lost from any solution at temperatures up to 100°F. but most lost ammonia at about 140°F.

Tests were also made using boric acid as the borate additive. Minimum changes in crystallization temperatures and densities were observed, but solutions with pH values below 7 (acidic solutions) were obtained. Since boric acid solutions can promote container corrosion to a greater extent than alkaline borate solutions such as those of POLYBOR-2, and boric acid shows no marked advantages, its use is not recommended.

From the findings of this laboratory study, it would be expected that POLYBOR-2 should be a satisfactory boron carrier for addition to many formulations of liquid fertilizers. It is much superior to borax as it is more readily soluble and causes the minimum changes in crystallization temperatures. Indications are that POLYBOR-2 can be added to the more common formulations up to 2.78% (5.0% borax equivalent) while maintaining a crystallization temperature below 35°F. POLYBOR-2 in amounts up to 4.14% (7.5% borax equivalent) can be added in specific instances with no crystallization below 35°F. No drastic changes in pH or density were detected in any of the formulations studied.

Table I. Summary of Crystallization Temperatures

BORATE	TEMPERATURE RANGE			
	15° F	15-25° F	25-35° F	35-70° F
0.00% Borax	9- 9- 9 10- 5- 5 5-10- 5 10-10- 5 12- 8- 4 3- 9- 9	5-10-10	8-24- 0	
2.50% Borax		10- 5- 5 3- 9- 9	9- 9- 9 5-10- 5 8-24- 0	5-10-10 10-10- 5 12- 8- 4
5.00% Borax				ALL
2.78% POLYBOR-2 (5% Borax Equiv)	10- 5- 5 5-10- 5 10-10- 5 3- 9- 9	8-24- 0	9- 9- 9 5-10-10 12- 8- 4	
7.50% Borax				ALL
4.14% POLYBOR-2 (7.5% Borax Equiv)			5-10- 5 8-24- 0	9- 9- 9 5-10-10 10- 5- 5 10-10- 5 12- 8- 4 3- 9- 9

Table II. Density in lbs/gal. at 70° F.

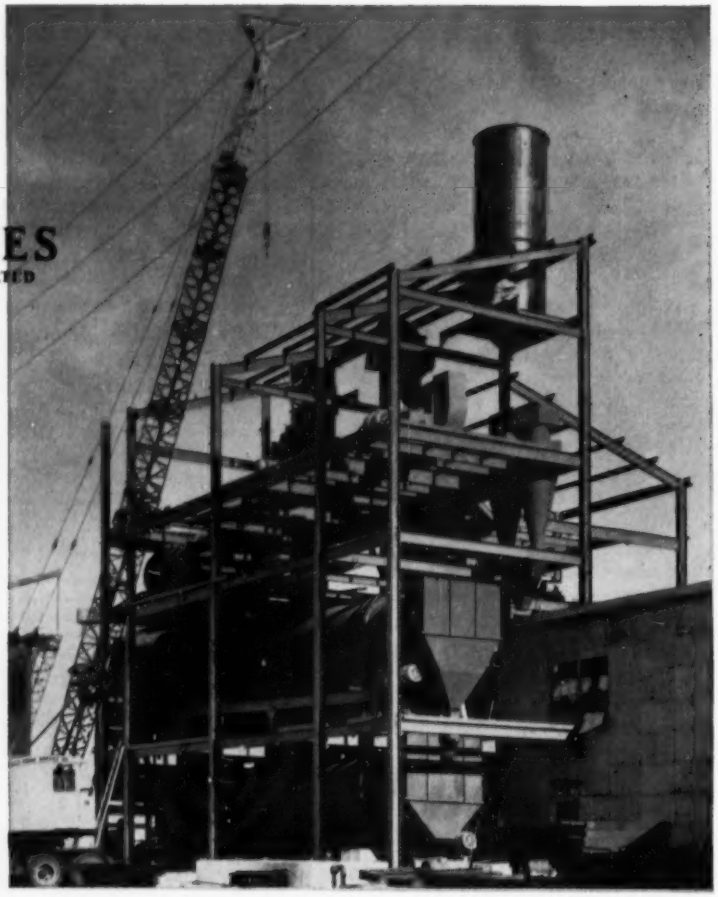
BORATE	FORMULATIONS							
	9-9-9	5-10-10	10-5-5	5-10-5	10-10-5	12-8-4	3-9-9	8-24-0
0.00% Borax	10.3	10.3	9.7	9.8	10.1	9.9	9.9	10.5
2.50% Borax		10.4	9.7	9.9	10.2	9.7	10.1	10.7
5.00% Borax	10.5	10.4	9.9	10.0	10.3	10.2	10.3	
2.78% POLYBOR-2			9.9	10.0	10.2	10.0	10.1	10.7
7.50% Borax	10.7	10.7	10.0	10.2	10.3	10.3	10.4	10.9
4.14% POLYBOR-2	10.6	10.5			10.3	10.2		

Table III. pH (1:10 dilution) at 70° F.

BORATE	FORMULATIONS							
	9-9-9	5-10-10	10-5-5	5-10-5	10-10-5	12-8-4	3-9-9	8-24-0
0.00% Borax	6.9	7.3	6.6	7.2	7.4	7.2	7.3	7.0
2.50% Borax	7.1	7.1	6.9	7.1	7.1	7.2	7.1	6.9
5.00% Borax	7.3	7.3	7.3	7.3	7.4	7.6	7.5	
2.78% POLYBOR-2			6.9	7.1	7.1	7.1	7.0	6.8
7.50% Borax	7.7	7.6	7.8	7.7	7.6	7.8	7.7	7.0
4.14% POLYBOR-2	7.2	7.1			7.2	7.3		

Fertilizer production unit of Land O'Lakes Creameries' Minneapolis plant, before siding was applied

LAND O'LAKES
CREAMERIES INCORPORATED



from an idea in June to productive operation in January —the Land O'Lakes Fertilizer Plant

In the opinion of several experienced fertilizer producers, time was too short to start from scratch in June 1955 and have a new fertilizer plant in operation to meet the 1956 market demands.

But Land O'Lakes management decided to flash the go ahead sign. In July Blaw-Knox accepted the challenge—to engineer, construct, and install a TVA continuous ammoniation and granulation system in time to produce for the 1956 fertilizer season.

Engineering was well under way in August. Ground broken in September. Structure housed by November. Final installations finished in December. Operation started in early January. Well over 30,000 tons of granular fertilizer produced and sold during spring season of 1956.

That was the tight schedule maintained by Blaw-Knox—in spite of heavy snowfalls and temperatures that dropped at times to 30° below zero.

This was, of course, an unusual assignment. But it demonstrates the ability of Blaw-Knox to handle tough jobs. So when you are considering a modernization, an expansion or a new plant program, we would welcome the opportunity to study your project with you and submit our recommendations.

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Spencer Contest Finds Oldest Fertilizer Dealer

Results of a contest, held to find the oldest fertilizer dealer in the United States, have been announced by the editors of "TFD," fertilizer trade publication of Spencer Chemical Co.

The contest winner, who still helps operate a 90-acre farm in addition to conducting his fertilizer business, is 91-year-old W. F. Hilfiker of Portland, Ind. Runner-up was 88-year-old W. F. Haenke of Gilbert, Minn.

In another division of the contest, 75-year-old Dan Hardwick, Sr., won the award for the fertilizer dealer with the most years of service. Head of the Hardwick Fertilizer Company in Loris, S. C., he has been in the plant food business continuously since 1897. George F. Voelker, Evansville, Ind., a fertilizer dealer for 59 years, was the second high man in this division. These four top men, who had an average age of 83 and had been in business for an average of 57 years, will receive engraved plaques from the magazine.

In all, a total of 192 entries were received in the contest with the average age of all dealers represented being 50 years and average length of time in the fertilizer business, 20 years. Dealers winning honorable mention (age and years in business noted in that order) were: Charles Dodge, 84, 26, Wausau, Wisc., H. L. Lenth, 83, 31, Riceville, Ia., W. H. Lavender, 80, 36, Weir, Miss., Alex Trulson, 80, 4, Britt, Ia., L. Y. Irvin, 79, 55, Cornelia, Ga., E. Wedeking, 76, 57, Dale, Ind., R. C. Collin, 75, 56, Mt. Pleasant, Mich., W. Gillespie, 71, 46, Effingham, S. C., H. D. Mays, 70, 46, Campbellsville, Ky., and Max Wilhelmi, 67, 50, Lawrence, Kans.

Baker Publishes Ammoniating Paper

Condensation of a report by Hackerman & Hurd has been published as a bulletin by J. T. Baker Chemical Co., Phillipsburg, N. J., where it is available gratis. The title is "Ammonium Thiocyanate as Corrosion Inhibitor for Ammoniating Liquors."

STEADY ON

USDA feels the soil bank program may keep farmer total production costs from rising above last year's level, despite increases in many factors—because planted acreage is down 3-4%.

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INSTITUTE SETS UP GROUP TO STUDY ROADSIDE PLANTING

The roadsides of the 41,000 mile National System of Interstate and Defense Highways, now under construction, will require the concerted efforts of engineers, contractors, and suppliers of equipment and materials to produce lasting roadside beauty that will be economical to maintain and, above all, that will protect the tremendous investment authorized by the Federal Government.

To this end, the Task Force on Roadside Development of the National Plant Food Institute's Research and Education Committee is giving its full cooperation to the Committee on Roadside Construction and Maintenance of the American Road Builders' Association.

Members of both committees have as their goal "an educational job of teaching contractors and others the virtues of sound fertilizing practices in the establishment and maintenance of good turf and ornamentals," on the new network of roads. They point out that the new network will connect all principal metropolitan areas, cities and industrial centers and eventually will be joined to the 200,000 miles of primary state roads and the 500,000 miles of secondary roads linking farms and smaller communities. This new highway system will cost upwards of 50 billion dollars and will require 13 years to finish.

"Not only business and truckers, but everyone in the country will benefit from this new road program," the committees emphasized.

A recent survey of state highway department practices made by the Fertilizer and Mulch Committee of the American Road Builders Association, based on replies from 41 states shows:

Nearly all states use some fertilizer to establish turf and ornamentals;

Eight states recommend the use of fertilizer for maintenance, while an additional 20 states use fertilizer occasionally, or as warranted, on some "trouble areas" only;

The most frequent fertilizer ratios used are: 1-1-1, 1-2-1 and 1-3-1;

A large variety of grades is being used from 3-12-12, 4-10-4, 5-10-5, 10-10-10, 12-12-12, 8-16-16, 10-6-4, to 13-13-13, 20-35-0, 12-12-0, 10-20-10, 16-20-0, 16-20-8.

Some states (14) reported a preference for granulated inorganic nitrogen grades over the organic nitrogen-meal type fertilizers, and only three states prefer organic nitrogen to inorganic sources.

Hydraulic application of fertilizer and seed or fertilizer and mulch is making converts, with 20 states reporting use of such a facility. Areas in the humid region use lime to reduce soil acidity and most states prefer an agricultural ground limestone for this purpose.

Some states are beginning to use soil testing as a guide to fertilization, but the majority follow a local, standard fertilizer treatment without guidance of a test. The rate of application per thousand square feet as reported varied from 9.2 to 30 pounds of complete fertilizer.

The lack of uniformity as to grades of fertilizer, rates of application, method of placement or application, or soil testing prior to fertilizing and liming emphasize the need for the proposed educational campaign.

The committees conclude that the most efficient and economical way to maintain a turf is to "build maintenance in it at the start," and that road contractors should be held responsible for establishing permanent roadside turf, and recognize the fact that more than one growing season may be required.

Both committees conclude that "successful roadside turf establishment and maintenance can be achieved only through a close working relationship between the road contractors, the state agricultural colleges and the fertilizer, seed, and nursery interests working with state landscape authorities."

The committee pointed out that the new 41,000 mile interstate highway system will have over 1,000,000 acres of roadside area susceptible to landscape treatment, including turf, ground cover or woody cover of trees and shrubs, for which between 205,000 and 400,000 tons of fertilizer could be used effectively for the initial establishment of turf and shrubbery and about 125,000 tons would be needed annually for proper maintenance. Unless this vast area is completely covered with vegetation, serious erosion and drainage problems will follow.

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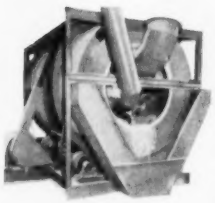

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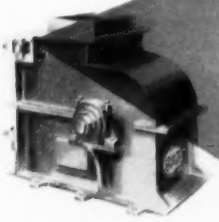

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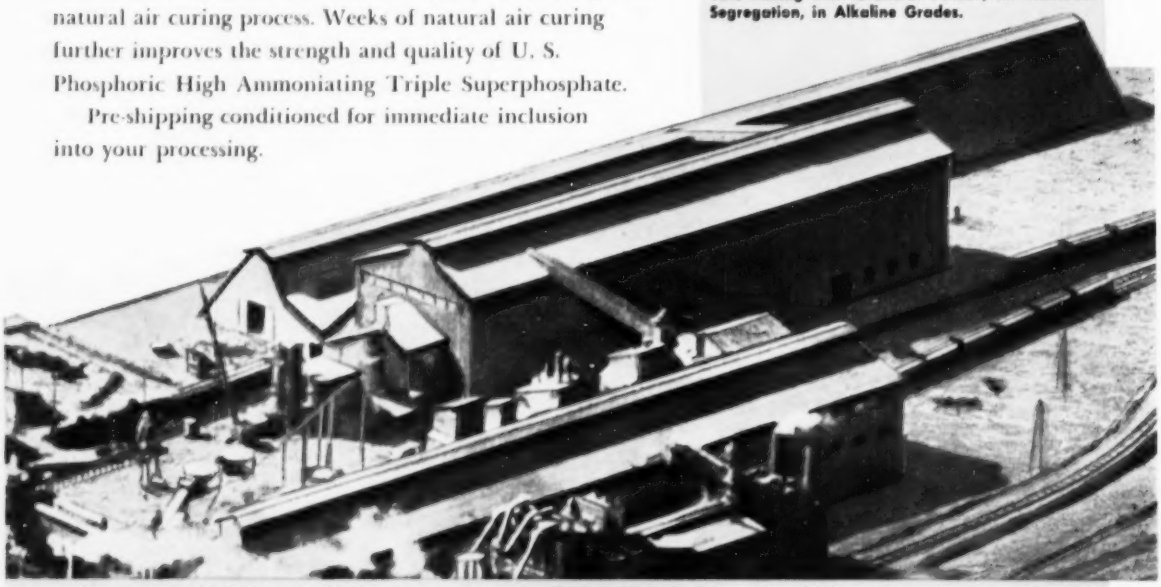

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PHOSPHORUS solubility, particle size and placement as related to the UPTAKE of fertilizer phosphorus and crop YIELDS

by R. L. Cook[1], Kirk Lawton[1], L. S. Robertson[2], *and* C. M. Hansen[3]

Contribution from the Departments of Soil Science and Agricultural Engineering, Michigan Agricultural Experiment Station, East Lansing, Michigan. Authorized for publication by the Director as Journal Article of the Michigan Agricultural Experiment Station.

Net returns from investments in phosphate fertilizer depend largely upon the proportion of the fertilizer phosphorus which enters the plant. This in turn, varies with the nature of the fertilizer (5,6,7,9), the rate, time and method of fertilizer application, the nature of the soil, and the species of plant (2).

Since the early 1920's, the National Joint Committee on Fertilizer Application has been studying methods of applying fertilizer. The 1948 report of that committee (1) stated that "Restricted contact of fertilizer with soil lessens fixation of phosphate and potash." It was assumed that lessened fixation would result in greater intake of phosphorus by the plant and a corresponding increase in efficiency of fertilizer use.

In the early work, band placement proved to be the effective method of obtaining "Restricted contact" between fertilizer and soil. Generally, greater yields were obtained by placing phosphate fertilizers in bands, than by mixing them with the soil. Lately, another method of obtaining restricted fertilizer-soil contact has presented itself, that of application as granules or pellets. Thus particle size has entered the picture (4).

During the 1920's phosphorus was mostly applied as superphosphate, a product largely but not entirely water soluble. Many phosphate carriers are now on the market. They vary in water solubility from zero to 100 percent.

Experimental Methods

These experiments were conducted in the field, greenhouse, and laboratory. In most of the trials fertilizers were applied in two locations, in a band to the side and slightly below the seed or mixed with the soil. The mixing was more thorough in the greenhouse experiments than in those conducted in the field.

In field experiments, liquid fertilizers were applied in three ways, by injection in bands and by spraying at the time the corn plants were emerging, and in bands at planting time. Solid fertilizers were banded at planting time, banded beside the row while plants were emerging and applied broadcast.

Granular and pulverant fertilizers were applied in such a way that their effects on yields and phosphorus uptake might be compared. The materials were made up to vary in degree of phosphorus water solubility from 2 or 3 percent to 95 percent.

Phosphorus uptake from fertilizer was determined chemically by total phosphorus determinations and by use of the radio-active phosphorus[4] techniques outlined by Lawton et al. (2).

Migration of Phosphorus from Granules

When fertilizers are mixed with soil, the area of contact between fertilizer and soil depends upon the fertilizer particle size. In determining the most desirable method of application, it is necessary to know what happens to the phosphorus in a fertilizer granule after it is placed in soil. Lawton and Vomicil (4) showed that soil moisture content was a factor, that at field capacity 50 to 80 percent of the water soluble phosphorus moved out of superphosphate granules in 24 hours, but that even at very low soil moisture levels (2 to 4 percent) the figures were 20 to 50%. These same workers showed further that, while soluble phosphorus moved out of granules very rapidly, it moved away into the soil very slowly. Thus, so long as the soil was not stirred, there remained around a granule a highly concentrated "shell" of soluble phosphorus.

Lawton and Cook (3) mixed superphosphates (pulverized and granulated of two particle sizes) with sandy loam soil. They found that rate of fixation of the phosphorus into non-water soluble forms depended upon particle size; from the large particles, fixation was slow, while from the pulverized material fixation was very rapid.

Water Solubility of Phosphorus? Is it Important?

During the early days of fertilizer usage most of the phosphorus reached the soil in the form of monocalcium phosphate (superphosphate). Accordingly, little thought was given to degree of water solubility. Recent changes in fertilizer technology have changed this picture. Materials now being used range in degree of water solubility from almost zero to 100 percent. Experiments show that crop yields may be affected by degree of solubility and that water solubility should be considered in deciding upon a method of application.

Webb (8) found that in 18 Iowa field experiments conducted over a period of 3 years the effectiveness of the phosphorus in fertilizers applied **in the hill** for corn was directly and closely correlated with the percentage of the fertilizer phosphorus which was soluble in water.

At the Michigan station, the importance of degree of phosphate water solubility has been determined in several ways. Corn was grown on Rifle peat in greenhouse cultures. Three fertilizer materials were compared, two high aluminum nitric phosphates containing respectively 10 and 30 percent of the phosphorus in water soluble form were compared with concentrated superphosphate (95% of the phosphorus water soluble). Each material was used in connection with lime applied at four rates, 0, 5, 10, and 15 tons an

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[1] *Professor, Soil Science.*

[2] *Asst. Professor, Soil Science.*

[3] *Asst. Professor, Agricultural Engineering.*

[4] P^{32} labelled fertilizers were furnished through the courtesy of the Fertilizer and Agricultural Lime Section, Soil and Water Conservation Research Branch, U. S. Department of Agriculture, Beltsville, Maryland.

acre. The results are shown by Fig. 1. With a single exception, yields of corn varied directly with the degree of water solubility of the phosphorus in the fertilizer. It is difficult to explain the high yield obtained as a result of the high lime, no phosphate treatment.

In a field experiment, corn was grown on Fox sandy loam where 30 pounds of P_2O_5 was applied in bands as pulverant fertilizer. Six materials, different only in respect to degree of phosphate water solubility were compared. The curves in Fig. 2 show that yields, in general, increased with degree of water solubility and that percentage of fertilizer phosphorus in the plants varied directly with the percentage of the fertilizer phosphorus soluble in water. The readers attention is especially called to the fact that the fertilizer was **banded,** below and to the side of the seed.

In another greenhouse experiment pulverant fertilizers to supply 80 pounds of P_2O_5 were banded for corn and beans. Four materials containing respectively 3%, 19%, 43%, and 87% of their phosphorus in water soluble form were used. The curves in Fig. 3 show that at the end of 8 weeks both crops had obtained much more phosphorus from the soluble fertilizer than from that which was almost insoluble. Practically a straight line relationship resulted. Again note that the fertilizer was banded and pulverant.

Particle Size and Placement vs. Water Solubility

The data represented by Figs. 1, 2, and 3 show that when pulverant fertilizers were banded, degree of phosphorus water solubility was very important, so far as yields and uptake of fertilizer phosphorus were concerned. The question now arises, Does the same thing hold when pulverant fertilizers are mixed with soil and when granular fertilizers are applied?

Beans were treated in Rifle peat greenhouse cultures with 80 pounds of P_2O_5 an acre. Four materials, different with respect to degree of phosphorus water solubility, were applied. Furthermore, each material was applied in pulverant and granular form. The pulverant materials were banded and mixed with the soil. An examination of Fig. 4 shows that the results were very interesting. Notice first that the almost insoluble granular fertilizer did not increase bean yields. All other materials did cause increases and the **soluble** granular phosphate material resulted in the highest yield.

As in the experiment already described, the efficiency of pulverant banded material increased directly with increase in the degree of water solubility of the fertilizer phosphorus. The relationship was again almost a straight line.

The picture with respect to degree of fertilizer water solubility changes now as one looks at the curve drawn from the yields obtained where pulverant fertilizer was mixed with the soil. With that material and placement, highest yields occurred where the fertilizer phosphorus was not water soluble and lowest yields occurred where it was 87% water soluble. Apparently fixation of the phosphorus into forms not available to the bean plants was greater from the soluble materials than from those which contained relatively insoluble forms of phosphorus. Thus it seems that fertilizers should not contain a large part of their phosphorus in water soluble form if they are pulverant and are to be mixed with soil.

Referring again to results from Iowa, Webb (8) found that whereas degree of phosphorus water solubility had a marked effect on corn yields when the fertilizer was applied in the hill, it had much less effect when the fertilizer was broadcast and plowed under. The latter method in effect was quite similar to the Michigan "mixed in" method of application; contact between fertilizer and soil was great.

The curves in Fig. 5 emphasize even more than do the yield curves in Fig. 4 that fertilizers containing water insoluble phosphorus should be pulverant and should be mixed with the soil. The bean plants so treated contained. at the age of 8 weeks, over three times as much fertilizer phosphorus as did those

Figure 1. The effect of lime on the dry weight of corn plants grown on a peat soil which received fertilizers of varying phosphate water solubility.

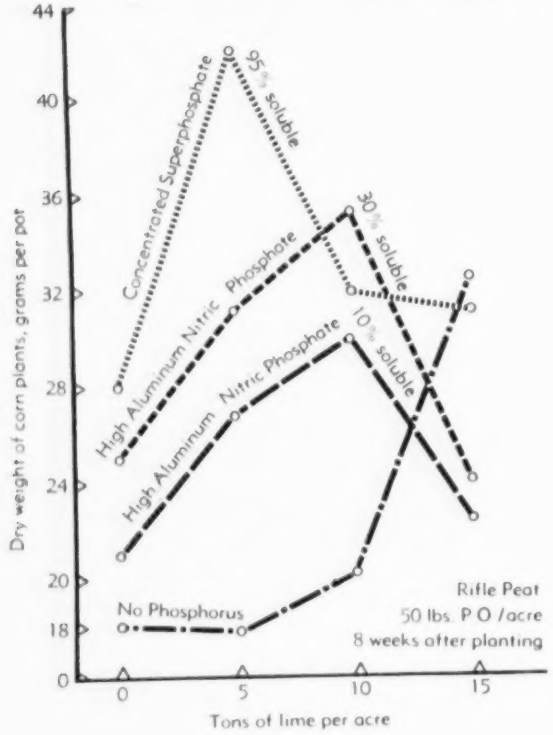
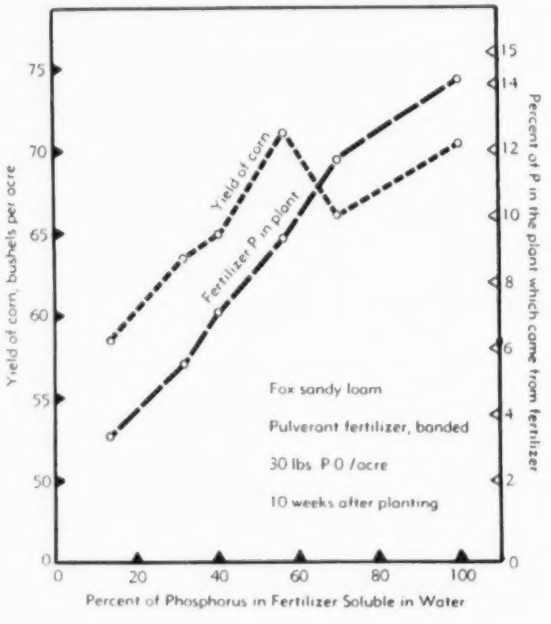


Figure 2. The yield and fertilizer phosphorus content of corn as affected by the phosphate water solubility content of nitric phosphate fertilizers.


Yield of corn, bushels per acre
Percent of P in the plant which come from fertilizer
Yield of corn
Fertilizer P in plant
Fox sandy loam
Pulverant fertilizer, banded
30 lbs. P O /acre
10 weeks after planting
Percent of Phosphorus in Fertilizer Soluble in Water

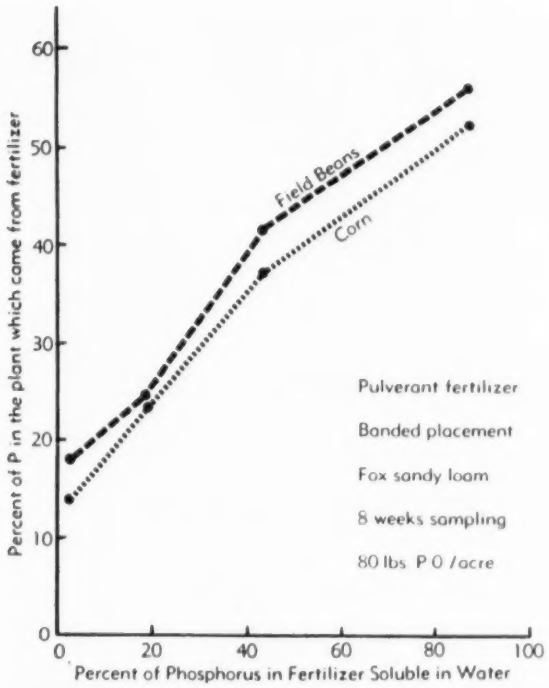

Percent of P in the plant which come from fertilizer
Field Beans
Corn
Pulverant fertilizer
Banded placement
Fox sandy loam
8 weeks sampling
80 lbs. P O /acre
Percent of Phosphorus in Fertilizer Soluble in Water

Figure 3. The influence of phosphate water solubility on the absorption of fertilizer phosphorus from banded fertilizer by corn and field bean plants.

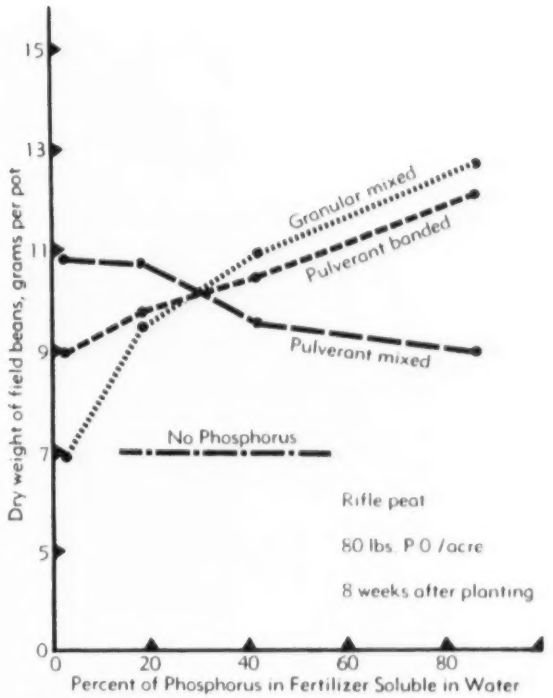


Figure 4. The effect of particle size and placement of fertilizers of varying phosphate water solubility on the dry weight of field beans grown in the greenhouse.

which had been fertilized with the same kind of fertilizer but in a granular form. According to the data, bean plants used fertilizer phosphorus most effectively when pulverant fertilizer was banded and when the water solubility of the phosphorus was nearest to 100 percent.

The data illustrated by the curves in Fig. 6 show that with wheat grown on Conover loam as with beans on Rifle peat, highest yields from pulverant fertilizer mixed with the soil were obtained where the fertilizer phosphorus was insol-

Figure 5. The effect of particle size and placement of fertilizer on the fertilizer phosphorus content of field bean plants grown in the greenhouse.

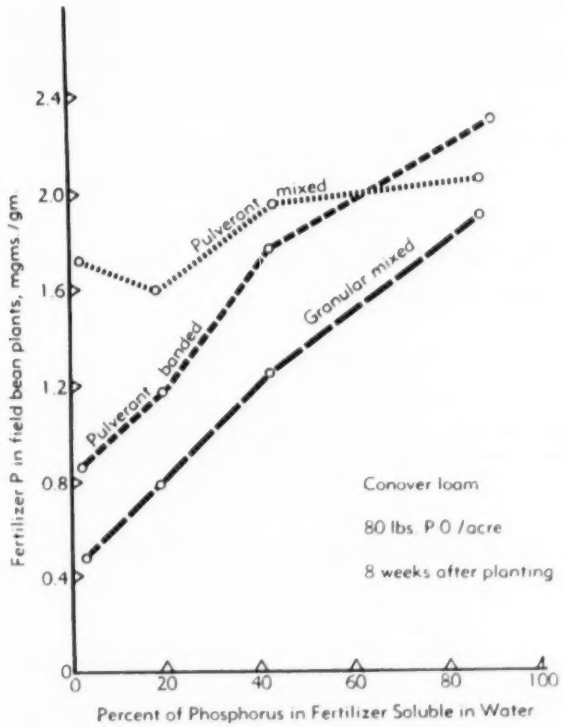
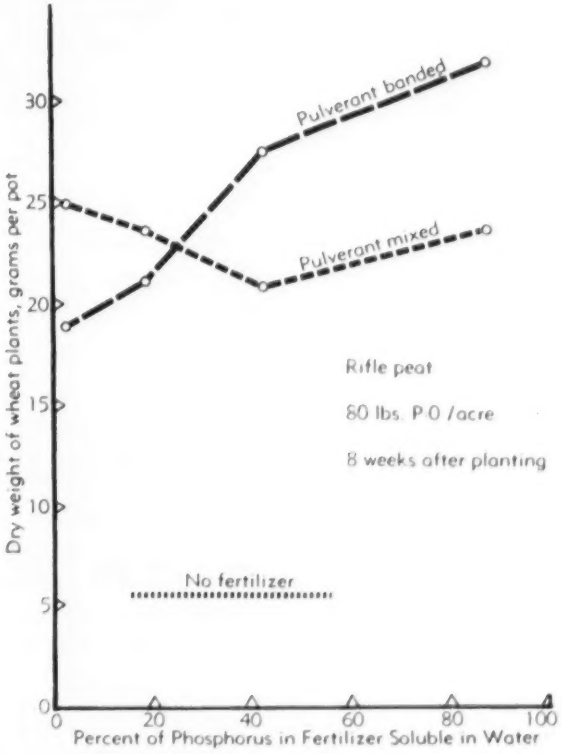

Fertilizer P in field bean plants, mgms./gm.
Pulverant mixed
Pulverant banded
Granular mixed
Conover loam
80 lbs. P O /acre
8 weeks after planting
Percent of Phosphorus in Fertilizer Soluble in Water

Figure 6. The effect of method of placement and phosphate water solubility of fertilizers on the dry weight of wheat plants grown in the greenhouse.


Dry weight of wheat plants, grams per pot
Pulverant banded
Pulverant mixed
Rifle peat
80 lbs. P O /acre
8 weeks after planting
No fertilizer
Percent of Phosphorus in Fertilizer Soluble in Water

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uble in water. On the other hand that same fertilizer resulted in the lowest yields where it was banded and the highest yields occurred where the most soluble phosphorus fertilizer was banded.

A study now of Fig. 7 shows again that fertilizer phosphorus uptake had a logical relationship with plant growth at the age of 8 weeks. Lowest intake occurred where insoluble fertilizer was banded and highest intake occurred where the banded fertilizer contained 87% of its phosphorus in water soluble form.

Figures 4 and 6 offer a clue as to the minimum percentage of the fertilizer phosphorus which should be in water soluble form to make it advisable to place pulverant fertilizer in bands. Theoretically this figure might be placed at the point where the yield curves cross for banded and mixed fertilizers. The figure for beans is 31 and for wheat 25 (see Fig. 6.). Considering, however, the point of intersection of the corresponding curves for fertilizer phosphorus uptake one might be influenced to place the figures somewhat higher. With both crops the uptake curves crossed at approximately 60 per cent. Perhaps the minimum percentage should be around 40 percent.

Solid vs. Solution Fertilizers

Water soluble phosphorus soon becomes insoluble and perhaps unavailable when it is mixed with soil. This is indicated by the pulverant mixed yield curves for beans and wheat in Figs. 4 and 6. The downward direction of those curves can be explained only by assuming that the water soluble phosphorus was fixed into forms less available to plants than the phosphorus in the fertilizer which contained only 3% of its phosphorus in water soluble form. It would seem then that liquid fertilizers should not be mixed with soil but should be applied in the same manner as soluble solid fertilizers. Clearly, they cannot be granulated so it only remains that they should be applied in bands. There is, of course, a posibility that liquids may be sprayed directly on crop residues and thus be turned into the soil without appreciable mixing. Perhaps there may be merit in such a method of application.

Field experimental results have shown that solid and liquid fertilizers must, for greatest efficiency, be applied in the same manner. Radio activity counts made on 8 weeks old corn plants showed that counts were about equal where liquids and solids had been banded, as they were also where the two forms of materials had been mixed with the soil. The counts, however, were about three times as high where the fertilizers were in bands as where they were mixed in. The same formulations were involved, as the liquids were obtained by dissolving the solid fertilizers in water. It is very essential in comparisons between solids and liquids that the solid material have a high percentage of its phosphorus in water soluble form.

In a 1955 field experiment on Kalamazoo sandy loam, 50 pounds of P_2O_5 was sprayed on corn plots just as the corn was emerging. On other plots, the same material was injected in a band close to the row. The yield where the spray method was used was 56.0 bushels an acre, as compared to a yield of 72.9 bushels where the injection method was used. Fixation of the phosphorus probably occurred where the phosphorus was sprayed and subsequently mixed in with a cultivator.

In 1956, liquid and solid fertilizers containing 50 pounds of P_2O_5 an acre were applied in bands below and to the side of the corn rows. The experiments were conducted on Hillsdale sandy loam and Kalamazoo sandy loam. On the Hillsdale soil the yield was 73.2 bushels an acre where the fertilizer was in liquid form and 71.3 where the material was solid at the time of application. On the Kalamazoo soil the differences were about the same but with the order reversed, 64.7 bushels for liquid and 67.6 bushels where solid material had been applied.

Summary

Experimental work was performed in the field, laboratory and greenhouse. P^{32} labelled mixed mixed fertilizers were furnished by the Fertilizer and Agricultural Lime Section, Soil and Water Conservation Research Branch, U. S. Department of Agriculture, Beltsville, Maryland. Several fertilizer mixtures were applied for corn, beans, and wheat. Granular and pulverant materials were mixed and banded in a variety of soils. Liquid and solid fertilizers were compared by spraying, banding, broadcasting, and mixing.

The following conclusions may be drawn from the field, greenhouse, and laboratory experimental results.

1. When pulverant fertilizer was well mixed with soil, the percentage of the phosphorus in a water soluble state had little effect on the percentage of fertilizer phosphorus absorbed by the plants. Likewise, yields were not affected by the degree of water solubility.

2. When granular fertilizer was well mixed with soil the percentage of the phosphorus in water soluble state did affect the percentage of fertilizer phosphorus absorbed by the plants. Furthermore, yields were closely correlated with fertilizer phosphorus absorption. To be effective, granular material should contain from 40 to 60 percent of its phosphorus soluble in water.

3. When granular or pulverant fertilizer was banded in soil, the uptake by plants of fertilizer phosphorus increased with an increase in the degree of water solubility of the fertilizer. Yields also increased with an increase in percentage of the fertilizer phosphorus in soluble form. For maximum uptake of phosphorus and top yields, fertilizers applied in bands should have at least 40 percent of the phosphorus in water soluble form.

4. Fertilizers which contain no water soluble phosphorus should be thoroughly mixed with the soil.

5. Fertilizers which contain no

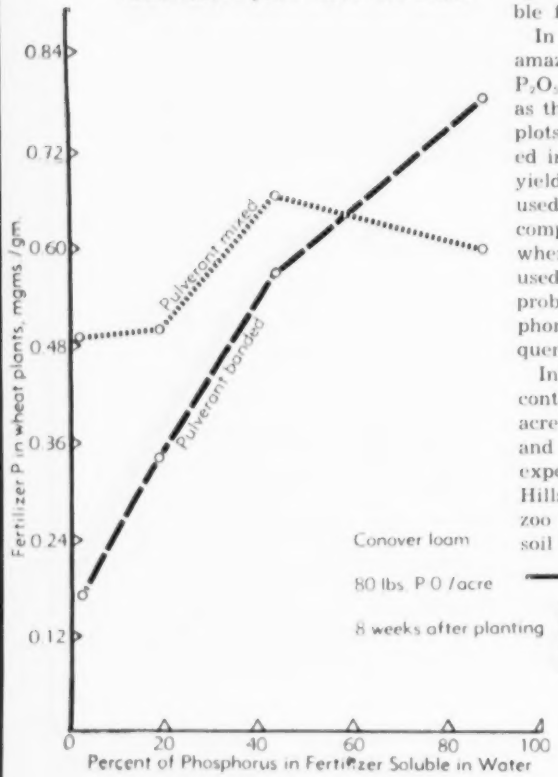


Figure 7. The effect of method of placement and phosphate water solubility of fertilizers on the absorption of fertilizer phosphorus by wheat plants grown in the greenhouse.

water soluble phosphorus should be pulverant rather than granular.

6. Liquid fertilizers were found to be about equal to solid fertilizers as sources of phosphorus when comparable materials were placed similarly in the soil.

LITERATURE CITED

1. Cumings, J. A. and National Joint Committee on Fertilizer Application. Methods of applying fertilizer. Pamphlet No. 149. The National Fertilizer Association, 616 Investment Bldg., Washington, D. C. (1948).

2. Lawton, K., Apostolakis, C., Cook, R. L., and Hill, W. L. Influence of particle size, water solubility, and placement of fertilizers on the nutrient value of phosphorus in mixed fertilizers. Soil Science, in press.

3. Lawton, K. and Cook, R. L. Interaction between particle size and water solubility of phosphorus in mixed fertilizers as factors affecting plant availability. Farm Chemicals, pp. 44-46 (April 1955).

4. Lawton, K. and Vomocil, J. A. The dissolution and migration of phosphorus from granular superphosphate in some Michigan soils. Soil Sci. Soc. Amer. Proc. 18: 26-32 (1954).

5. Rogers, H. T. Crop response to nitraphosphate fertilizer. Agron. Jour. 43: 468-476 (1951).

6. Starostka, R. W., Caro, J. H., and Hill, W. L. Availability of phosphorus in granulated fertilizers. Soil Sci. Soc. Amer. Proc. 18: 67-71 (1954).

7. Tisdale, S. and Winters, E. Crop response to calcium metaphosphate on alkaline soil. Agron. Jour. 45: 228-234 (1953).

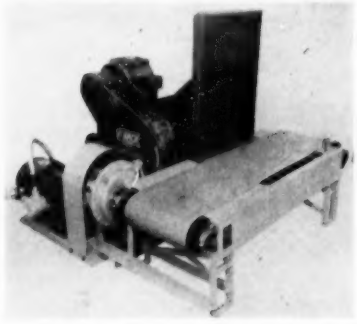
8. Webb, John R. The significance of water solubility in phosphatic fertilizers. Proceedings, Joint Meeting Agronomists with the Fertilizer Industry, published by Middle West Soil Improvement Committee, pp. 64-68 (1955).

9. Whittaker, C. W., Coe, D. G., Bartholomew, R. P., Volk, G. W., and Rader, L. F. Jr. Influence of placement on response of crops to calcium phosphates. Jour. Amer. Soc. Agron. 39: 859-868 (1947).

Cobalt Development Institute Formed

The world's major cobalt producers have formed the Cobalt Development Institute, whose object is to develop uses for cobalt and improve present application. The program is to be executed by the Centre d'Information du Cobalt, 35 Rue des Colonies, Brussells, Belgium, and the Cobalt Information Center at Battelle Memorial Institute, 505 King Ave., Columbus 1, O.

This jack belt conveyor, developed by Richardson Scale Co., assures that any temporary interruption of the sewing process will not bring bag packing to a standstill. Full details from Hart Bandstra, Richardson Scale Co., Van Houten Ave., Clifton, N. J.



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RESEARCH RESULTS & REPORTS

Cal State's Dr. Bruce Kennelly says: "Much of agriculture's future is tied to mankind's new ability to disturb the peaceful tranquility of ordinary, everyday "happy atoms" and convert them into "high strung, nervous atoms." What he means is that atoms are increasingly important in agronomical detective work, which will tell us how crop chemicals work, and so how to make them better and apply them more effectively. A vital research tool, in other words.

O

Trees are getting more and more attention. VPI publicizes fertilizer drilling into holes around the rim of shade trees to make 'em more shading faster. West Virginia has some excellent research data on the improvement of fruit quality for canning, nitrogen being the main topic of their discourse along these lines.

The Federal Reserve Bank devotes a whole bulletin to the subject of fertilizing wood lots, the article being based on Phillip Wakely's "Planting Southern Pines"—a Forest Service publication.

O

Soybeans don't need high fertility, according to data from the Eastern Shore area, and in many cases continuous cropping has gone on without any effort to maintain fertility. But the worm will finally turn, they report, and deficiency symptoms appear. Soybeans need a lot of plant food, especially potash and calcium, before they show the result of feeding. But they do need it.

O

Lime needs time. Like the soybeans discussed above, it takes a while for the effects of liming to show up . . . often the second or third crop in the rotation. But once the lime takes hold, smaller applications can maintain the soil at the proper pH level.

O

New Jersey AES has a $50,000 grant for a 5 year study of the relation of soil type to the availability of trace elements to crops. The donor, who prefers to remain anonymous, has given them money before this for other research purposes.

O

Flavor from fertilizer was a worry out in California, but the Food Technology Department reports that no significant change in vitamin C or soluble solids content from tomatoes fertilized at varying rates of NPK. Dr. Bor S. Luh conducted the research.

O

5,500,000 pounds more calf would be produced in Oklahoma if supplemental phosphorus were applied to the entire phosphorus-deficient areas of that State, according to Dr. Robert Totusek, Oklahoma A&M.

O

Sawdust again comes into the picture. Science, driving by heaping mountains of the stuff, have wondered for years if there might be some way to use it that would warrant the transportation to central processing plants, or if some process could be devised to work it right at the source.

Now comes the Institute of Forest Products with a two-year research product. Advanced students at the U of Washington will do the leg-work, under the direction of Stanley P. Gessel. Your editor, to whom economic waste is abhorrent, hopes fervently that something will come of this. In the State of Washington alone, 32,000,000 cubic feet of the stuff goes up in smoke annually. Think of the volume nationwide!

O

Cornell is making plans to triple the number of soil samples it has been testing for New York State farmers.

O

Penetration of rainfall, studied on a principle mentioned in these pages some time ago, but on a big scale, is a research project in California's San Joaquin Valley. USDA and the US Forest Service have sunk huge kettles in the ground, which will supply isolation booths for tests of the relationship of rainfall to fertilization. Tests will show leaching, penetration and other factors, with isotopes to help make the measurements accurate.

NITROGEN BOOSTS COASTAL BERMUDA PROFITS

Heavy applications of nitrogen fertilizer must be used on irrigated Coastal Bermuda grass in order to obtain maximum returns on investment, according to tests conducted by Richard A. Schwartzbeck, assistant agronomist of the Winter Garden Agricultural Experiment Station at Crystal City, Texas.

Average yields for 1955 and 1956 ranged from 2.88 tons of air-dry forage per acre on irrigated plots receiving no nitrogen to 13.03 tons per acre on those fertilized with 600 pounds of elemental nitrogen (1,800 pounds of 33.5 percent ammonium nitrate).

From the Agricultural News Letter, Federal Reserve Bank of Dallas, April 15, 1957.

Besides the check plots which received no nitrogen and those which received 600 pounds, four other groups of check plots received elemental nitrogen at rates of 120 pounds, 240 pounds, 360 pounds, and 480 pounds, respectively, during each of the 2 years. The nitrogen was applied, following each cutting of Coastal Bermuda grass, in four equal applications. All plots received an annual application of 200 pounds of 45 percent superphosphate.

Mr. Schwartzbeck calculated costs and returns per acre for each of the different levels of fertilization for established pastures of irrigated Coastal Bermuda grass. In making the calculations, he used average production costs of farms in the

Production Costs And Calculated Income From The Application Of Nitrogen Fertilizer On Irrigated Coastal Bermuda Grass, 1955 And 1956, Crystal City, Texas

Pounds of elemental nitrogen applied per acre annually	Tons of air-dry forage per acre	Fertilizer cost per acre	Total cost per acre[1]	Gross returns per acre[2]	Net return per acre	Net return per dollar invested
0	2.88	$ 7.80	$ 39.80	$ 86.40	$ 46.60	$1.17
120	6.70	24.90	56.90	201.00	144.10	2.53
240	9.80	42.00	74.00	294.00	220.00	2.97
360	10.70	59.10	91.10	321.00	229.90	2.52
480	11.96	76.20	108.20	358.80	250.60	2.32
600	13.03	93.30	125.30	390.90	265.60	2.12

[1] Includes fertilizer and the following production costs per acre: Irrigation (seven times), $28, and top-dressing fertilizer (four times), $4; total, $32 per acre.

[2] Air-dry forage valued at $30 per ton.

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area growing Coastal Bermuda grass under irrigation, $78 a ton as the cost of treble superphosphate, $95 as the cost of ammonium nitrate, and a forage value of $30 a ton.

Throughout the test, the net return per acre increased constantly as successively heavier applications of nitrogen were made, indicating that—under the cost-price relationships used—additional profits could be obtained even if more than 600 pounds of nitrogen were used. A net return of $46.60 per acre was obtained when no nitrogen was applied, but a net return of $265.60 was realized with an application of 600 pounds of elemental nitrogen.

Although Mr. Schwartzbeck used a forage value of only $30 per ton, net returns would have been greatest at the 600-pound nitrogen level even if forage had been valued at $20 per ton. These data suggest that unless the farmer has more remunerative uses for his capital, it may be unwise to restrict use of fertilizer on irrigated Coastal Bermuda grass in the Crystal City area in order to reduce farm operating expenses.

The net return of $2.97 per dollar invested in fertilizing, irrigating, and top-dressing the Coastal Bermuda grass was the highest when 240 pounds of elemental nitrogen were applied per acre. This return compares with $1.17 when no nitrogen was used and $2.12 when 600 pounds were applied. Yields of forage continued to increase beyond the 240-pound per acre level, but at a diminishing rate.

SOIL - - - -

Moisture - - - -

NUTRIENTS - - - -

CROPS

New knowledge of this complex relationship points way to better management of water and fertilizer

Soil moisture tension (the tenacity with which water clings to soil particles) has been widely accepted as the controlling factor in a crop's ability to get water. But studies now show that tension also profoundly influences nutrient uptake and that water content of a soil is an important additional factor in availability of both water and nutrients.

A thorough understanding of these principles developed through USDA-State research should open the way to much better integration of water and fertilizer management than we've been practicing in the humid East as well as in the irrigation areas.

Tension, content are varied

ARS soil scientist D. B. Peters, working cooperatively with the Illinois Agricultural Experiment Station, compared root growths in soils at various moisture contents and various moisture tensions. When there was no difference in moisture content, tension regulated the amount of root growth. But among soils at the same tension, soils with the greater moisture gave the greater root growth. In this case, soils of higher clay content held greater amounts of water.

Water flow controls growth

When water is extracted by the root, more water must flow to the root from the soil mass before further extraction can occur. The movement of replacement water largely determines how fast plants can take up water and grow. The soil's capacity to hold water and to transport it determines the distance over which roots may obtain water. The rate at which a new supply moves in is determined by both soil moisture tension and by the ability of soil to conduct water. The ability of soil to conduct water is influenced by soil water content. Therefore, both the tension and the content are important.

Peters also made preliminary studies of the effects of soil moisture tension and soil moisture content on nutrient absorption by plants. He added various amounts of radioactive rubidium to soils of different textures and, with the aid of a Geiger counter, measured the amount of rubidium taken into corn roots.

Contrary to expectation, the total volume of nutrients in the soil did not determine how much nutrients would be taken up. Instead, the root got more nutrients as the nutrient solution in the soil became more concentrated. Stated another way, at any one moisture tension, the lower the moisture content (due, for example to greater soil coarseness), the richer the nutrient solution and the greater the nutrient uptake. That is consistent with the method of nutrient absorption through exchange of ions between a root and the soil.

Nutrient transport is factor

But when the nutrient solution was enriched by adding more nutrients (rather than by increasing tension through reducing soil moisture) a new factor entered the picture. Increasing the amount of nutrients per unit of soil brought about a gain in the nutrient uptake—a disproportionately large gain compared with the amount of nutrient applied. This showed that the plant's nutrition was influenced by some factor in addition to the nutrient applications—probably a transport phenomenon.

After the initial increase in rubidium uptake as wet soil (soil in the low-tension range) dried out, there was a gradual decrease in rubidium uptake while tension further increased. Peters thinks this could be caused by (1) reduced diffusion of the nutrient within the moisture next to the root, where extraction occurs; and (2) by a lag in mass flow of nutrient-laden moisture through the soil to the root as water is locally depleted—especially the latter.

The study further showed that in a drying soil, as moisture tension rises, nutrient starvation sets in before water starvation does. Apparently, nutrient transfer is more drastically affected than water flow.

From May issue—"Agricultural Research"

Stedman Issues New Fertilizer Catalog

A new 24-page 2-color catalog showing its complete line of equipment for the fertilizer industry has just been published by the Stedman Foundry and Machine Company, Inc., Aurora, Indiana.

Included are machinery illustrations, foundation plans and complete information concerning Stedman's Granular Fertilizer Process, 4 lines of Batch Mixers, Continuous Ammoniators, All-Steel Mixing Units, Tailings Mills—both Hammer and Double Cage Types, and Vibrating Screens—single and multiple deck units. New machines, not shown in any other Stedman literature, are included in this Catalog No. 515.

For your copy of the catalog, write to L. A. Rhodes, Stedman Foundry & Machine Co., Inc., Aurora, Indiana.

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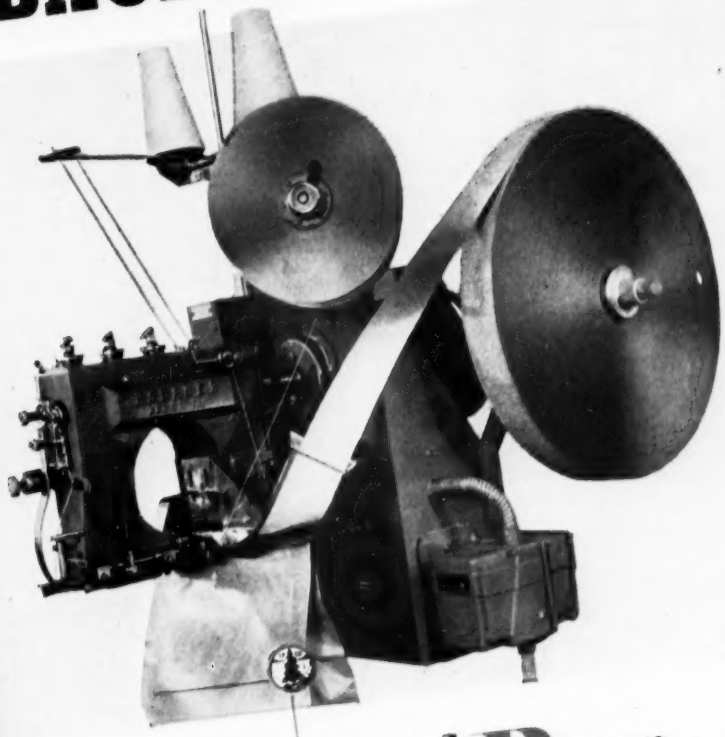

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National Fertilizer Solutions Association's

1957 CONVENTION IN CINCINNATI

The 1957 convention of the National Fertilizer Solutions Association will be held at the Netherland-Hilton Hotel in Cincinnati, November 17 to 19, it has been announced by executive secretary Muriel F. Collie.

A new feature for this convention is the establishment of supplier conference rooms, in place of the usual trade show, where the suppliers will set up display boards, show samples, distribute literature, and enjoy privacy, informality and comfort while conferring with their customers. Dealers and distributors have expressed appreciation of this arrangement, which will give them an opportunity to discuss, with fewer interruptions, the problems and plans which they want to take up with their suppliers. Formal announcement of the availability of these supplier conference rooms has just been made to the industry, and it is anticipated that there will be a larger representation of supplier companies than at any previous convention. Supplier conference rooms will be open from 6:00 to 10:00 P. M. on Sunday, and for specified hours, not conflicting with convention sessions, on Monday and Tuesday, November 18-19.

Of particular importance to manufacturers of equipment and supplies, as well as of interest to mixers of solutions and wholesalers and dealers, is the general session on standards scheduled for Sunday morning November 17. This discussion session is being planned by the Standards Committee of the Association, the chairman of which is Roy F. Broyhill of The Broyhill Company, Dakota City, Nebraska. Other members of the committee are: W. Harold Schelm, Schelm Bros., Inc., Peoria, Illinois; and Donald R. Weber, Spraying Systems Company, Bellwood, Illinois. At this session, it is expected that a program of standardization will be developed for such items as tank fittings, size designations for all nozzles, etc. All segments of the industry are invited to attend to make known their views and to help get this important project under way.

President E. E. Crouse, United States Liquid Fertilizer Corporation of Indianapolis, is calling a meeting of the Board of Directors for Sunday evening. Following election of new Board members Monday, directors will meet again that evening for election of officers and to plan the program for the ensuing year.

The National Fertilizer Solutions Association announces the adoption of this insignia of membership. This is an unusually appropriate insignia, and all members of the Association are being urged to use it extensively in their literature, advertising, and on all letterheads and other printed material. Electros of the insignia are available to all members of the Association at the present time, and it is anticipated that insignia decalcomanias will become a part of this program soon.

General sessions will be held Monday morning, November 18, and Tuesday morning and afternoon, November 19. Outstanding speakers have been invited to talk on selling and customer relations; material supply outlook, with chemical producers covering nitrogen, phosphoric acid, and potash; local consumer meetings—an audience participation discussion; essentials to success, from the standpoints of sales ethics, agronomy, and economics; and, again with the chemical producers participating, additives to fertilizer solutions, with individual assignments on various pesticides in fertilizers, trace elements, and possibilities of the new hormones.

The annual banquet, with a top-flight speaker, will be held on Tuesday evening, November 19, 1957, following which the supplier conference rooms will be open for a two-hour period to close the convention.

Membership in the association has been growing steadily, and a large registration from all segments of the industry is expected. Non-members of the organization are cordially invited to participate in the 1957 convention, and to view work the association is doing.

Ernest M. Harper, Nitrogen Division, Allied Chemical & Dye Corporation, Indianapolis, is chairman of the 1957 convention planning committee and in full charge of all arrangements. Serving with him on the committee are: William G. Calvert, Lafayette Farm Supply, Inc., Lexington, Missouri; Ralph Helmstatter, H & R Agricultural Service, Norwalk, Ohio; John Ackley, John Deere Planter Works, Moline, Illinois; O. L. Ohnstad, Ohio Fertilizer, Inc., So. Solon, Ohio; and president E. E. Crouse.

Headquarters office of the association is at 2217 Tribune Tower, Chicago 11, Illinois.

President E. E. Crouse of the National Fertilizer Solutions Association has issued an announcement of the appointment and activation of the following committees:

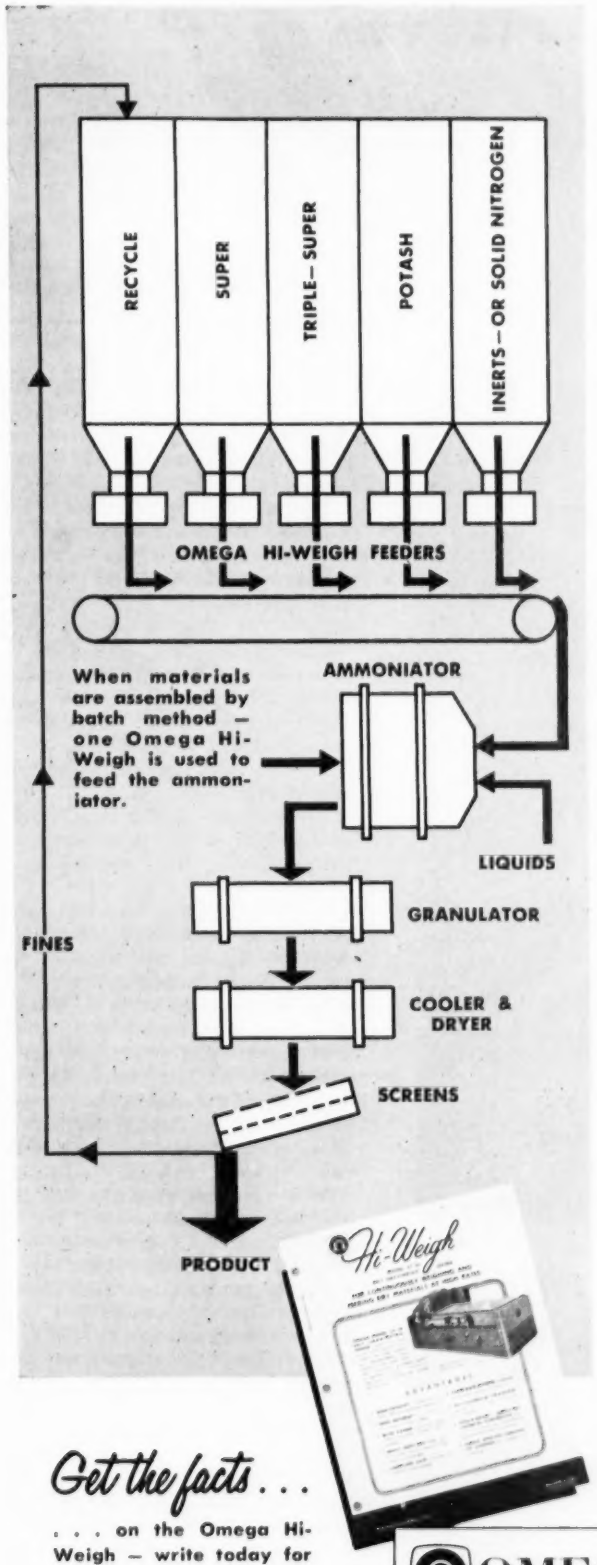
Activities Committee: W. Harold Schelm, chairman, Schelm Bros., Inc., Peoria, Illinois; Hugh S. Surles, Jr., Planters Cotton Oil & Fertilizer Co., Rocky Mount, North Carolina; J. M. Green, Krause Corporation, Hutchinson, Kansas; Melvin Beerman, Beerman Bros. Dehydrating Co., Dakota City, Nebraska.

Convention Planning Committee: Ernest R. Harper, chairman, Nitrogen Division, Allied Chemical & Dye Corp., Indianapolis, Indiana; William G. Calvert, Lafayette Farm Supply, Inc., Lexington, Missouri; Ralph Helmstetter, H&R Agricultural Service, Norwalk, Ohio; John Ackley, John Deere Planter Works, Moline, Illinois; O. L. Ohnstad, Ohio Fertilizer, Inc., So. Solon, Ohio.

Membership Committee: Wayne R. Johnson, chairman, Johnson Bros. Mills, Inc., Shenandoah, Iowa; Donald A. Fletcher, Pacific Supply Cooperative, Ontario, Oregon; K. T. Grant, Ontario Plant Foods, Ltd., Delhi, Ontario.

Standards Committee: Roy F. Broyhill, chairman, The Broyhill Company, Dakota City, Nebraska; W. Harold Schelm, Schelm Bros., Inc., Peoria, Illinois; Donald R. Weber, Spraying Systems Company, Bellwood, Illinois.

Statistical Survey Committee: George H. Serviss, chairman, G.L.F. Soil Building Service, Ithaca, N. Y.; A. J. Schuler, Welcome Agricultural Chemical Co., Welcome, Minnesota; Richard Cecil, Owensboro, Kentucky.



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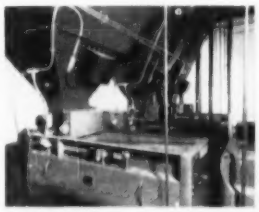

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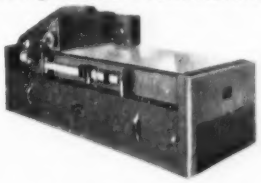

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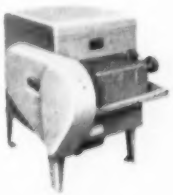

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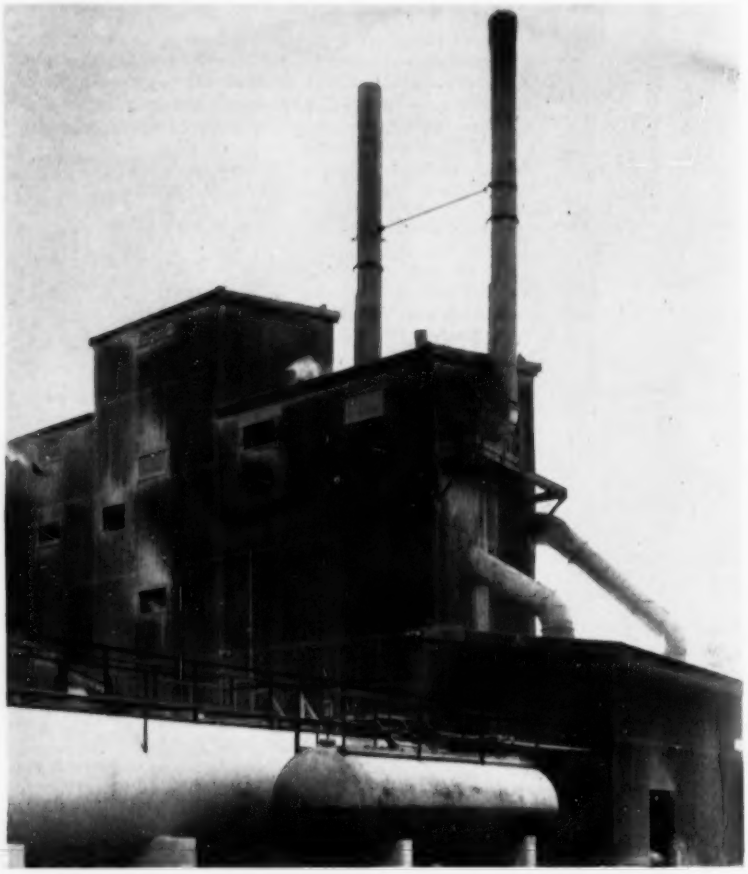
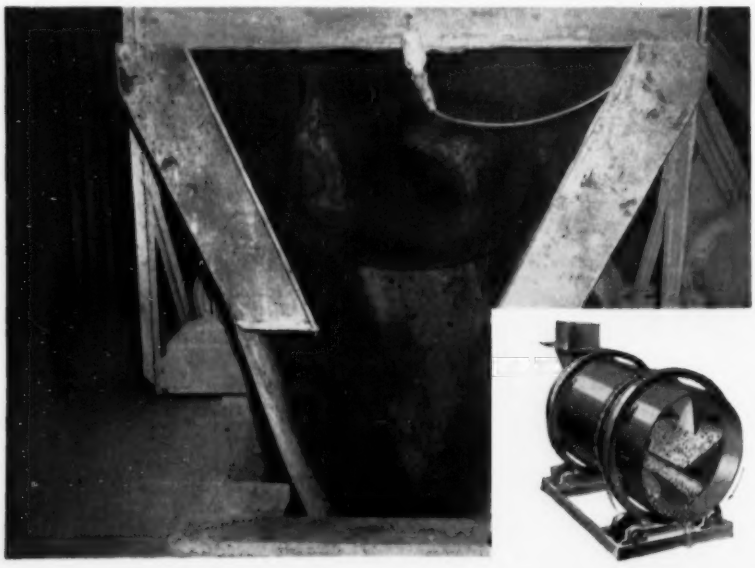
INDIANA BEGINS PRODUCTION OF Granular AT BRIGGS



Exterior view of new granulating building and liquid storage equipment.



Having experienced marked success with the conversion of their Indianapolis plant to the production of granular mixed fertilizers, The Indiana Farm Bureau Cooperative Association recently equipped their plant at Brigg, Indiana with similar facilities.

The modern Briggs Plant, which was constructed and made ready for the 1953 Fall season, was later expanded in 1955 with the addition of a high-capacity bulk shipping unit.

The original plant, the bulk shipping unit, as well as the new granulation facilities were designed and constructed by The A. J. Sackett and Sons Company of Baltimore, Maryland, who also fabricated the required production equipment and furnished field management during construction work, machinery installations and initial start-up operations.

The decision to install the new granulating process in a separate structure enabled normal plant operations to be carried on with little or no interference. Further, full use was made of the existing batching system, screening equipment, gravity mixer and belt conveying system. Mixed dry base is now transferred from this mixing equipment to the new granulating building by belt conveying means.

In the new building addition, the dry base is manufactured into a fully sized complete granular mixed fertilizer. The batch-wise flow of dry base is converted into a continuous flow by means of a belt type weighing machine. This continuous flow of dry base is then reacted with metered flows of sulphuric and phosphoric acids, anhydrous ammonia and nitrogen solutions within a T.V.A. type ammoniator. Water is added as needed. The mass then passes from the ammoniator into the STAR® Granulator, which new machine rolls the soft mass into firm pellets prior to dry-

View showing pelleted material being discharged from STAR® Granulator. Inset shows details. This revolutionary machine has recorded increases in product recovery of as much as 50%.

ing. The rotary, horizontal, oil-fired, direct heat, concurrent type dryer then reduces the moisture content of the granules to approximately 1½%. This moisture content can be varied slightly depending upon the grade being manufactured.

From the dryer the pellets are fed into a rotary, horizontal, countercurrent type cooler which lowers their temperature to within 25 or 30 F. of ambient temperature. The cooled pellets are then classified over a double deck electric vibrating screen.

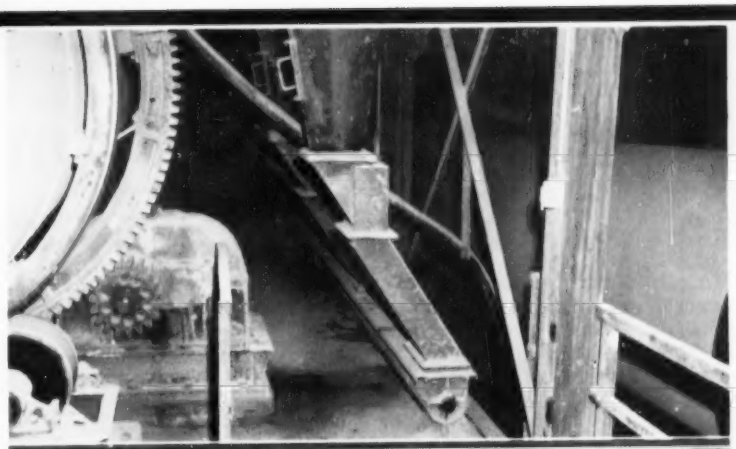
The screened product is delivered to the storage building to await shipment in either bulk form or in bags. The oversize is "cracked" by a specially-designed bar mill and returned to the screening equipment for re-classification. The fines from the screen together with those from the two dryer cyclones and the two cooler cyclones are returned to the ammoniator for reprocessing.

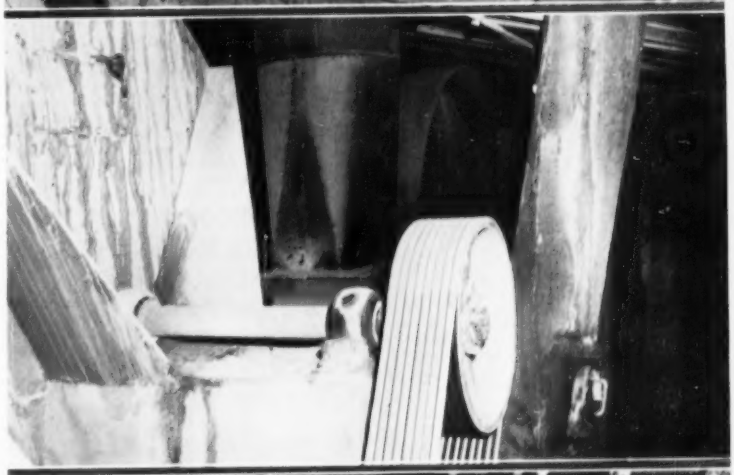
An unusual feature of the granulating process as installed at Briggs is the fact that all exhaust gases are scrubbed prior to exit to atmosphere. This has been accomplished by the installation of two Roto-clones. One of these units is used to scrub the dryer exhaust, while the other handles the exhaust from the ammoniator, STAR* Granulator and the cooler. Thus, all gases are exhausted from only two stacks.

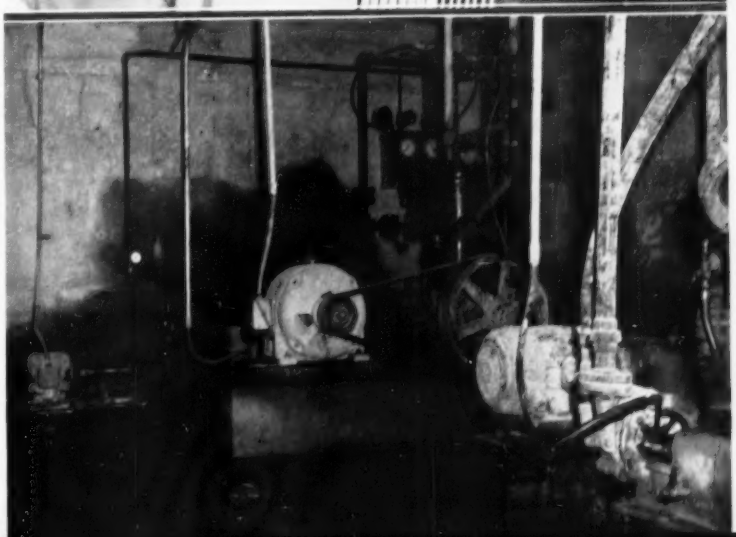
The waste water from the scrubbing units is collected into a sump. In order that a minimum of waste water be sewered, clean water from the top of the sump is re-circulated thru the scrubbers, and the slurry-like water from the bottom of the sump is pumped to the ammoniator for use as make-up water in controlling granulation. This slurry, which is returned to the ammoniator, carries with it most of the plant food nutrients removed by the scrubber, thus reducing the plant food loss to an absolute minimum.

Inasmuch as all liquid ingredients are being pumped into the process, a separate pump room was installed on the ground floor of the granulating building. This room together with an electrical and process control room, located at the ammoniator level, insure dust free operation of all pumps and controls.

*U. S. and Foreign Patents Pending.







PHOTOS TOP TO BOTTOM

1—View showing material being discharged from TVA type Ammoniator.
2—View of rotary dryer, rotary cooler and bottom portion of the four cyclones, discharging fines into screw conveyor.
3—View of Roto-clones with their individual drives.
4—View of pump and compressor room.

Research Mixing Plant Opened by Spencer

A pilot fertilizer mixing plant for research and demonstration was officially dedicated May 15, by Spencer Chemical Company. The plant will be used to develop research work on mixed fertilizer processing and make information available to all fertilizer manufacturers through demonstration and reports. The new plant is located at Spencer's Jayhawk Works near Pittsburg, Kansas.

The pilot plant will be operated by the company's Research and Development group, and the information will be disseminated by their Agricultural Chemical Division's Technical Service Department. Spencer is the first basic raw materials supplier to offer this service to fertilizer manufacturers.

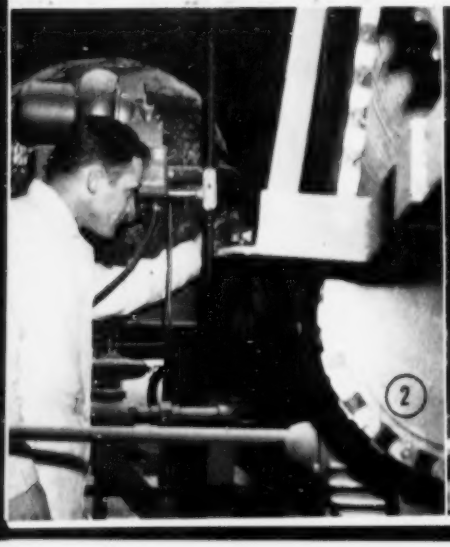
Dr. John R. Brown, Jr., vice president, Research and Development, said that Spencer should be able to develop fundamental processing information with this plant. He said that it is important to the well-being of the fertilizer industry to improve manufacturing techniques, and that private enterprise with a major stake in the future of this industry should properly pioneer in formulating fundamental data which will insure continued technological progress. Spencer has long been a major producer of nitrogen materials for the fertilizer industry.

Jack C. Denton, Spencer's vice president, Agricultural Chemicals Division, also present at the opening ceremonies, expressed the company's intentions of making information developed by the pilot plant completely available to all fertilizer manufacturers. "The success of this program," he said, "will depend upon the broad distribution of the improved processing techniques which will result from this research." The responsibility for the distribution of information belongs to Joe C. Sharp, manager of Agricultural Chemical Technical Service.

Mr. Denton indicated that specific projects presently being researched with the pilot plant facilities include studies to determine how to produce higher analysis mixed fertilizers with economical raw materials, to improve physical properties and mechanical condition of mixed fertilizer, and to improve generally the economics of fertilizer manufacture by getting better mileage from low cost raw materials.

The pilot plant is equipped with an ammoniator-granulator, dryer, cooler, screens, crushers, accurate metering devices and temperature recording equipment necessary to develop the most efficient process information. The plant has the potential of using any commercially available raw materials and producing any analysis that is chemically feasible.

1. The doors are now open to Spencer's new mixed fertilizer demonstration plant. Research and development personnel will operate the pilot unit to investigate processing improvements in manufacturing mixed fertilizers.
2. Highly instrumented, sensitive process controls and measuring devices will enable Spencer research personnel to apply sound development techniques in efforts to study potential improvements in fertilizer manufacture.
3. Officials of Spencer Chemical Co. inspect the first product produced at the demonstration mixed fertilizer plant the company just opened. Dr. John R. Brown, Jr. (right), vice president for Research and Development, shows Jack D. Denton (center), vice president of Agricultural Chemicals Division, and Joe C. Sharp, Agricultural Chemical Technical Service manager, how higher analysis granulated fertilizers can be produced in this pos experimental plant.



Vertical Screen Pamphlet Offered by Nordberg

Publication of Bulletin 243, an eight page, two-color bulletin describing the Symons V-Screen is announced by Nordberg Manufacturing Company, Milwaukee, Wisconsin. This screen is specifically designed for single separations in the finer sizes, ranging from 4 mesh down to as small as 80 mesh.

Bulletin 243 explains the entirely new screening action of the Symons V-Screen which multiplies its screening effect by combining centrifugal and gravitational forces. Details of its unique construction and operating characteristics are given. Operational data from installations demonstrate the successful application of the V-Screen in chemical, grain and food product plants.

Differing from conventional screens, the Symons V-Screen employs controlled diffused feed and vertical flow of material within a screening drum. Relatively low rotary speed and high speed gyratory action produce a separating force that more than doubles the capacity of each square foot of screen surface. The Symons V-Screen does not require a special foundation or anti-vibration devices.

Bulletin 243 is available, free upon request. Write Nordberg Manufacturing Company, Milwaukee 1, Wisconsin.

FIFTIES?—EIGHTIES?—HUNDREDS?

What's new in packaging PLANT FOOD?

Here are new developments in the packaging field that can mean increased profits per ton packed for fertilizer manufacturers whether you use open-mouth bags or valve bags.

J.B
we must
look into
this now!
J.A.M.

OPEN-MOUTH BAGS

- New high speed single scale capable of weighing over 30 bags per minute.
- New labor-saving sewing equipment that keeps pace with high speed bagging scales.
- Open-mouth bags that are engineered for high speed fertilizer packing with such features as thumb-notch, spot pasting, top creasing, offset gussets.

VALVE BAGS

- The new valve bag fertilizer packer that handles up to 22 bags per minute.
- Automatic bag clamps and bag discharge units that can step up your present packer to 20 80-lb. bags per minute.
- Pasted valve bags that reduce bag costs . . . make a stronger, more merchandisable package . . . take less warehouse and truck space.

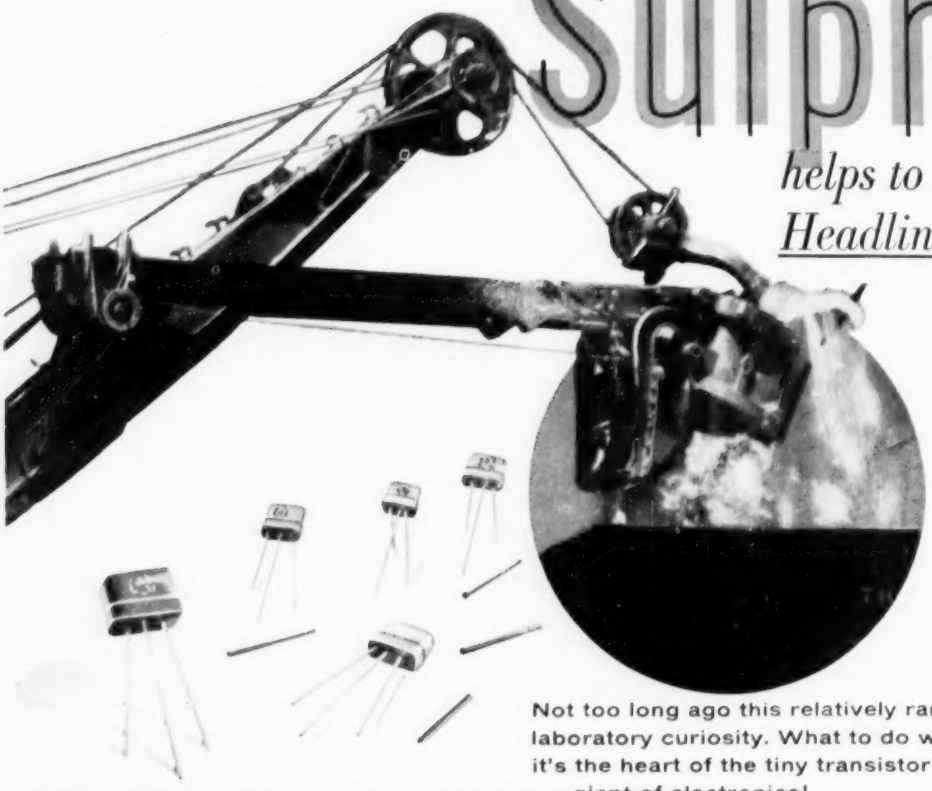
Why limp along with outmoded equipment when you can speed up production . . . make more profits per ton packed. If you plan to change to 50-lb. bags, this equipment is a must—it gets out your present tonnage in the smaller bag. Let us show you how this equipment can fit into your packaging operations. Simply write: Multiwall Packaging Division, Box 610, St. Regis Paper Company, 150 East 42nd Street, New York 17, N. Y.

St.Regis PAPER COMPANY

150 EAST 42ND STREET, NEW YORK 17, N.Y.

Sulphur

helps to create
Headline Products



GERMANIUM

Not too long ago this relatively rare metal was a laboratory curiosity. What to do with it? Today, it's the heart of the tiny transistor—the latest giant of electronics!

What's the connection between Sulphur and Germanium?

There are two, in fact. One is man-made, involving the routine leaching of Germanium ores with Sulphuric Acid prior to tetrachloride distillation. The other takes advantage of a peculiar property of the natural mineral, Germanium Sulphide. This mineral can be volatilized and then sublimed, providing an effective method of separating the Germanium from gangue material. The process is called "Concentration of Germanium by Sulphide Sublimation".

Again Sulphur, through its major derivative, Sulphuric Acid, and a natural sulphide play an important role in our ever-expanding economy. It is difficult to find many items in the broad chemical-metallurgical field that do not somewhere along the production line make use of Sulphur or a derivative.

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N.Y.
811 Rusk Avenue, Houston 2, Texas

Sulphur Producing Units
- Newgulf, Texas
- Moss Bluff, Texas
- Spindletop, Texas
- Worland, Wyoming

New RICHARDSON
MODEL HA-39 FERTILIZER BAGGER

Is Completely Automatic, Exceptionally Accurate

Where it counts this new Richardson Model HA-39 Fertilizer Scale leads the field—*on all counts!*

LEADS IN SPEED, ACCURACY AND ECONOMY . . . Actually up to twenty-four 50-lb., 80-lb., 100-lb., or 125-lb. bags of fertilizer per minute can be realized with extremely close accuracy per bag! It's built to save you time, labor, materials—*year after year!*

LEADS IN SIMPLICITY OF OPERATION . . . Completely automatic . . . incorporates belt feeder within the scale, pneumatic power for smooth, positive operation, and simplified electrical controls. Scale works steadily, continuously, to keep your production at a uniform record level (yet can be shut off, when necessary, with weigh hopper loaded).

Regulating gate controlling depth of stream on belt is conveniently adjustable from floor level.

LEADS IN EASE OF MAINTENANCE . . . Hopper is heavy-gauge stainless plate, and all other contact parts are of stainless steel. Controls are totally-enclosed—dust-tight. Entire unit is simple to understand, operate and maintain . . . built and backed by Richardson, the name representing over 50 years of experience with problems in every phase of weighing and proportioning.

Get *all* the facts. They're contained in Richardson Product Data Sheet No. 5601. Write for your free copy.

Richardson

MATERIALS HANDLING BY WEIGHT SINCE 1902

RICHARDSON SCALE COMPANY
Clifton, New Jersey

Atlanta • Boston • Buffalo • Chicago • Cincinnati • Detroit • Houston
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Richardson Scales S.A., 1-3 Rue de Chantepoulet, Geneva, Switzerland
Richardson Scale Co., Ltd., 40-42 George Street, Nottingham, England

CALIFORNIA

Shell Chemical has brought into production its new urea plant at Ventura, which has been reported here since its inception. It is the only plant of its type west of the Rockies, producing high analysis nitrogen fertilizer for Coast markets.

* * *

US Borax & Chemical last month began stripping the main borate ore body of their new open pit mine at Boron. They reached tincal ore at a depth of 137 feet. Since early 1956 they have moved 7,000,000 tons of overburden to reach "pay dirt." This is the largest known sodium borate ore body in the world, and is the first large open pit borate operation in the US. It is being worked by US's Pacific Coast division.

* * *

A. R. Maas Chemical have taken an option on 75 acres of industrial property at Richmond, and plan their first construction as a phosphoric acid plant and a catalyst plant. Maas is a division of **Victor Chemical.**

GEORGIA

Link-Belt has acquired 41 acres of land about 11 miles south of Atlanta as a possible future plant site, though no specific plans have yet been announced.

IDAHO

San Francisco Chemical, the joint subsidiary of **Stauffer** and **Mountain Copper** has begun work on the phosphate leases in the Swan Lake district. Sales will go to Leefe, Wyo. for benefication, or direct to market for soil application.

* * *

Simplot recently had a fire minor in character at Caldwell, when a tank of herbicide being unloaded from a railroad car burst into flames. There was considerable plant and equipment damage, covered by insurance, but the flames were extinguished within an hour. Safety valves protected other, nearby tanks.

ILLINOIS

Lik-Wid-Flo Co., Earlville, have let contracts for construction of a liquid mixed fertilizer plant. Equipment has been ordered.

INDIANA

Indiana Farm Bureau Cooperative have had **Blue Valley** granulation units installed in their plants at Schererville and Jeffersonville, according to **Arthur R. Mullin,** fertilizer department manager, who says "Installation of these new Blue Valley Granulation units was prompted by our ever-increasing demand for granular free-flowing fertilizer, plus the trend to higher analysis mixes from lower cost raw materials." The installation was made by **Blue Valley Equipment Mfg. and Engr. Co.,** Topeka, Kans.

* * *

U. S. Liquid Fertilizer Corp. will establish its fifth plant in Eaton, with **Tip H. Garner** in charge, according to word from the Indianapolis headquarters.

KENTUCKY

Jeffersontown officials are considering the construction of a garbage-disposal-fertilizer plant, estimated to cost around $130,000 to serve that portion of Jefferson County, according to **Mayor John T. Orlandi.**

LOUISIANA

Champion Chemical has begun construction of a new $200,000 plant near Canton to manufacture 21 types of insecticides and fungicides, in both liquid and powder form.

NEW JERSEY

Allied Chemical & Dye will build at Linden a plant to recover sulphur from the hydrogen sulfide gas produced at the **Esso** Bayway Refinery. The plant, which will turn out 60 daily tons is being designed and engineered by **Girdler.**

NORTH CAROLINA

Eastern Guano's plant and contents, at Fayetteville, were destroyed by fire early last month. General manager, **John W. Cates,** estimated damage at $200,000, partly covered by insurance.

NEBRASKA

Stauffer has completed installation of the new unit at Omaha to produce a broad range of granular insecticides.

OHIO

Diamond Fertilizer has opened its new fertilizer plant in Ottowa, where it has been operating for the past three years in property then rented, now purchased. Plans for the old buildings have not been announced.

* * *

Toledo has to decide whether to continue the sludge operation which is now losing $17,000 a year, due to the high cost of personnel and operation of the greenhouse method of drying.

TEXAS

Campbell Fertilizer, Houston, was slightly damaged by fire when the warehouse roof was ignited by sparks.

WASHINGTON

Pacific Agro Company, Seattle, have announced that construction is now under way on their new fertilizer-insecticide plant at Sunnyside. **Bob Allard,** general manager, stated that the plant will be completed in time to serve Eastern Washington growers with Agro insecticides, both dry and liquid, during the summer 1957 season.

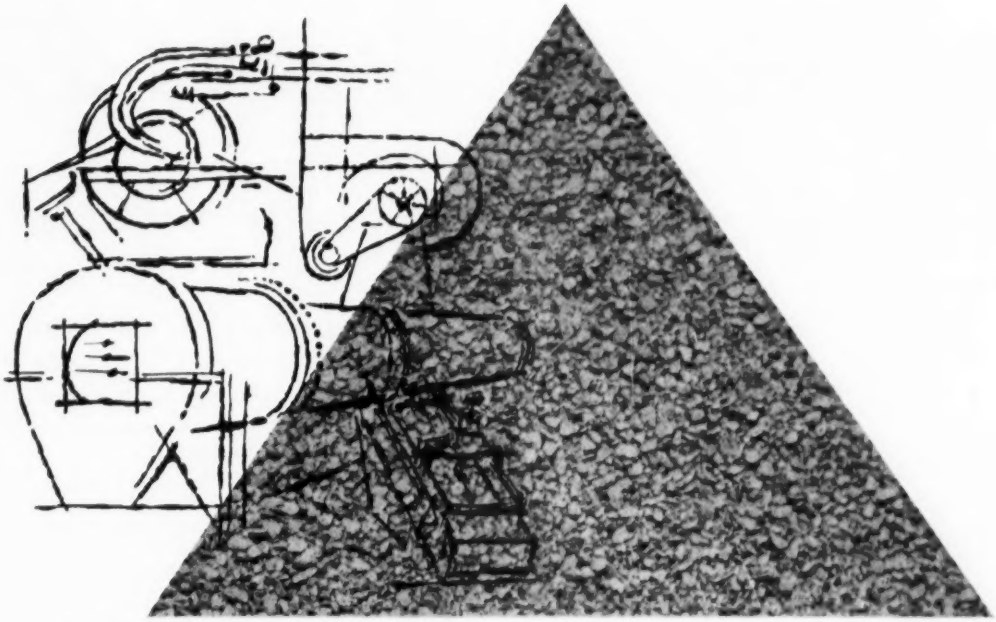
In addition to Agro insecticides products, the new plant will produce Agro specialty fertilizers. **Lee Fryer,** manager of the plant food division, said the fertilizer plant will be in operation by midsummer. The new plant will be operated by **Link Distributing Company** of Grandview, under the direction of **Ray Whitcomb** and **Wes Farwell.**

WEST VIRGINIA

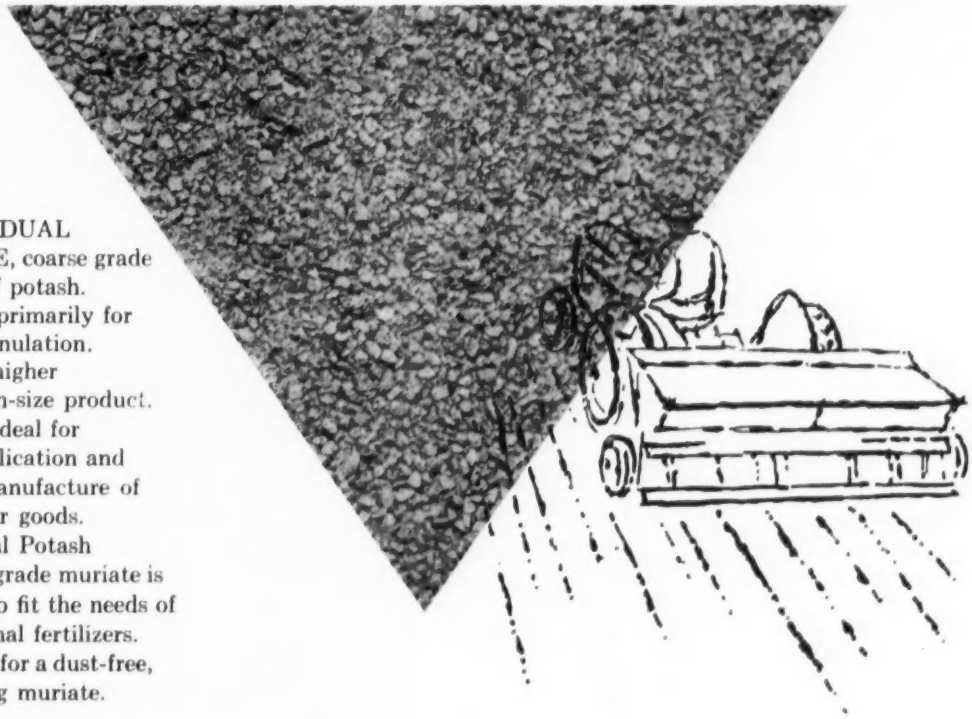
Monsanto's plant at Nitro experienced an explosion which demolished a 3-story building. The blast ruptured pipelines, permitting ammonia and chlorine to mix, which by neutralizing considerably reduced the danger of further damage.

CANADA

International Minerals and Chemical announced in mid-May an immediate start on the shaft for their new Saskatchewan potash mine. President **Louis Ware** points out that their Carlsbad operation has



LET NATIONAL POTASH SERVE YOU



Here is a DUAL PURPOSE, coarse grade muriate of potash. Designed primarily for use in granulation. It gives a higher yield of on-size product. It is also ideal for direct application and for the manufacture of top dresser goods.

National Potash standard grade muriate is designed to fit the needs of conventional fertilizers. Processed for a dust-free, non-caking muriate.

NATIONAL POTASH COMPANY
205 EAST 42nd ST. • NEW YORK 17, N. Y.

There's *two-way profit* in New, Improved USS Ammonium Sulfate

United States Steel's mills at Fairfield, Alabama are now completely equipped to produce new, improved, granular USS AMMONIUM SULFATE ... with a guaranteed nitrogen analysis of 21%.

1 Make 14-0-14

Southern soils need heavy applications of nitrogen and potash to produce good cotton and corn yields. Because USS Ammonium Sulfate is produced in uniform granules, it can be mixed with granular potash to make 14-0-14 fertilizer *that won't separate!* And remember that your most *practical* source of nitrogen for 14-0-14 is the new, improved, granular USS AMMONIUM SULFATE.

2 Straight Application, Too

For customers who prefer straight nitrogen fertilizer for side-dressing, be sure to recommend USS Ammonium Sulfate. It's granular, free-flowing and guaranteed in both quality and analysis. It also supplies 24% sulfur, an essential plant food. Take advantage of both the 14-0-14 and nitrogen side-dress markets. Order a supply of new, improved, granular AMMONIUM SULFATE, today.

USS Ammonium Sulfate

7-686

UNITED STATES STEEL

been at capacity for a number of years and the Canadian project will take care of expanding business.

* * *

Northwest Nitro-Chemicals has added a unit to their Medecine Hat plant which will permit production of four new fertilizer formulations, according to president **T. L. Brook.**

* * *

Shell Oil is working toward a 300 daily tons of sulphur as by-product of a plant in the Okotoks gas field near Calgary which will produce 30,000,000 daily cubic feet of natural gas.

* * *

North American Cyanamid is to build at Beachville, Ont. a lime burning plant of 300 daily tons capacity. **Catalytic Construction** is engineering the project.

* * *

Electric Reduction will build a $5,000,000 plant at Port Maitland, on Lake Erie. From their yellow phosphorus facilities at Varennes will come raw material for electrothermal phosphoric acid. They will install wet-process equipment as well. The acid will be converted into a wide range of sodium and calcium phosphates. Originally this plant was scheduled to be erected in the Hamilton Bay area.

* * *

St. Regis Paper has begun operations at Hinton in the first pulp mill to be constructed in the province of Alberta. It is operated by **Northwestern Pulp & Power Ltd.** and represents an investment of $42,000,000 by St. Regis and **North Canadian Oils Ltd.** St. Regis is exclusive sales agent.

ENGLAND

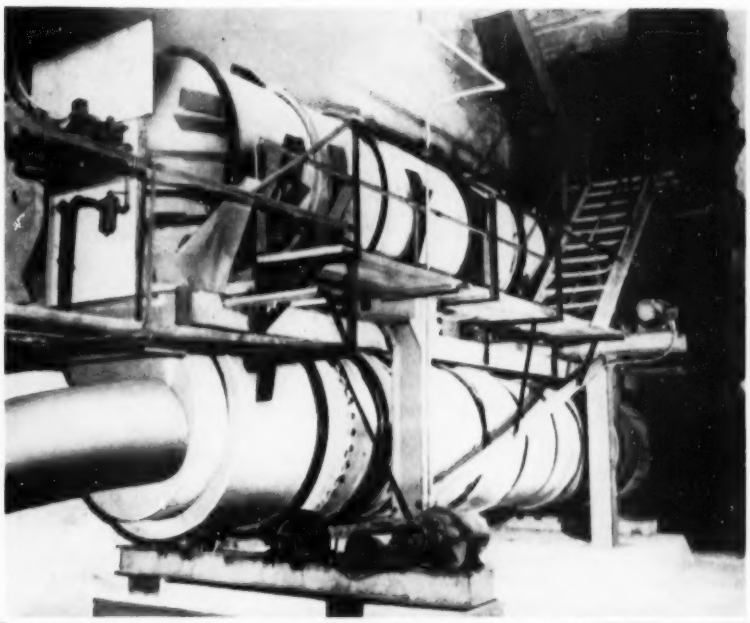
Fisons has started construction of their 200,000 pound horticultural fertilizers plant at Bramford, near Ipswich. It will contain every possible use of mechanization and when ready will produce 60,000 annual tons.

IRAQ

The Government will open bids June 25 for a plant to produce 350 daily tons of sulphur, recovered from natural gas, which is to be set up near the **Iraq Petroleum** operation at Kirkuk. They have selected **Ammonia Casale** to work on construction of $23,700,000 fertilizer plant Basarah which will produce 250,000 annual tons of ammonia sulphate, mostly for export.

MEXICO

Guanosy Fertilizantes, S.A. will shortly ask for bids for the triple superphosphate plant at Coatzcoalcos, Veracrus. They have let construction contracts for the $700,000 plant to be constructed in Cuautitlan, where they already have a superphosphate plant of 150 daily tons capacity. The **Pan American Consulting Co.**, Baltimore, will build the plant.



Central Chemical Corp. of Hagerstown, Maryland, announces installation of a Blue Valley Granulation Unit by the Blue Valley Equipment Manufacturing & Engineering Co. of Topeka, Kans. The unit was added to their present mixing and ammoniation process. Announcement was made by M. C. Morton, vice president of Central Chemical, who said, "the installation of this new Blue Valley Granulation Unit was prompted by our ever-increasing demand for granular free-flowing fertilizer, plus the trend to higher analysis mixes from lower cost raw materials". Pictured here is the new Blue Valley unit, showing the dryer-granulator and cooler drums. Mixing, ammoniation and screening parts of this equipment are not pictured.

* * *

Industrial Agronomica S.E. has been formed by Fabricated Metals, of California, with Mexico City as its base. It has been awarded the contract to build 4 plants to produce aqua ammonia for **Petroquimica de Mexico, S.A.**

PORTUGUESE ANGOLA

Consideration is being given construction of a chemical fertilizer plant in the Luanda area of Angola to utilize raw material byproducts from an oil refinery already planned for the near future. Annual production of 40,000 tons of various types of fertilizer is contemplated which will prove a boon to Angolan agriculture, since cost of material from local output reportedly would be less than that of currently imported fertilizers.

TRINIDAD

W. R. Grace & Co. is considering the erection of a multi-million chemical fertilizer plant in Trinidad, which if proper arrangements can be made with the Government there, will employ 400 people.

POTASH HUNT

Saskatchewan is buzzing with potash hunters. Two concerns have already sunk shafts. 19 others have concessions. The result, expected soon, should amount to $10,000,000 a year of commercial production. No telling how much further it can go as exploration turns into development.

SURE BET

Spencer's house organ TFD asks: "What if the year turns bad? Labor, seed, machinery depreciation and land charges are lost if the crop is not profitable. Only fertilizer carries over . . . making fertilizer the closest thing there is to a sure bet."

HOURLY PLANT WAGES UP

Without exception, the individual segments of the chemical industry showed increases in the 1956 annual average hourly earnings over those of 1955. These increases ranged from a low of 4.8 percent for soap, cleaning and polishing preparations to a high of 7.3 for fertilizers. As to the actual hourly earnings levels, the industrial inorganic chemicals segment maintained its long-time position as the highest, with an average of $2.32 for the year 1956, while fertilizers remained at the low end with $1.61.

Personals

Frank G. Hough, founder and chairman of the board of the company which bears his name, has just announced his retirement.

A pioneer in the bulk materials handling and tractor-shovel fields, Mr. Hough designed and sold his first hydraulic shovel attachment while vice president and general manager of the **Blair Manufacturing Co.**, Chicago, in 1922.

In 1931 he acquired the Blair Manufacturing Company and in 1933 The Frank G. Hough Co. was incorporated.

* * *

Marshall W. Butler has been appointed manager of the South Point, Ohio, plant of **Nitrogen Division, Allied Chemical & Dye Corp.** He succeeds **C. W. Bahrt, Jr.,** who has been made assistant to the director of production at Nitrogen Division's main office in New York.

* * *

The **Valley Nitrogen Producers, Inc.,** organized recently at Fresno, Cal., for the construction of a grower owned and controlled anhydrous ammonia plant, has elected a board of directors and officers.

The board members are **Mal Carberry, Jack Harris, Roland B. Hill** and **Victor I. Sandell,** all of Fresno; **Sam Hamburg,** Los Banos; **Sherman Thomas,** Madera, and **Carl H. Haas,** Hillsborough, San Mateo County.

Mr. Haas is the corporation president. Mr. Hill is vice president and Mr. Sandell is the secretary-treasurer.

Haas, who heads the **Haas Ammonia & Fertilizer Company** in Modesto, said the plans call for a plant with a 100 ton daily capacity. He said the facility will be adapted to the agricultural needs of the area and will have 50 employes.

Mr. Haas said the total capital required for the project will be $5,000,000. He explained San Joaquin Valley growers are the main subscribers.

The corporation is awaiting an offering permit from the commissioner of corporations which will authorize the completion of the stock sales.

Mr. Haas said the yearly production of the proposed plant will be about 35,000 tons of anhydrous ammonia which amounts to 7½ per cent of the total California production of 450,000 tons.

* * *

The appointment of **William E. Weems** to be manager of technical service for the phosphates department of **American Cyanamid Company's** phosphates and nitrogen division was announced by **Frank S. Washburn,** division manager. Mr. Weems joined Cyanamid in 1945.

* * *

H. Walton Arrowsmith today announced that, after 32 years in the agricultural chemicals business, he is retiring on June 1st for reasons of health. He was employed by the **American Cyanamid Company** in their agricultural chemicals division for 25 years. In 1950 he bought a ⅓ interest in the Western Farm Chemical Company, Walnut Grove, Calif., and established a branch of that Company in Woodland, Calif. Eighteen months later he bought the remaining interest in the Company and discontinued the Walnut Grove operation. A modern fertilizer mixing plant was installed and Arrowsmith was joined by his son, Dirck, in the operation of the Company. In February 1955 a branch office and warehouse was opened in Arbuckle, Calif. A year ago the Western Farm Chemical Company was sold to **John Taylor Fertilizers** and has been doing business since then as **Roy Riegels Chemicals.** Both Arrowsmiths continued in the employ of the new company.

* * *

The election of **Edward E. Slowter** as vice president of **Battelle Institute** was announced by **Clyde Williams,** president. A member of the Institute's technical and executive staff since 1936, Mr. Slowter has been the foundation's secretary and business manager.

* * *

Stauffer Chemical has appointed **C. D. Julien** as assistant to the Eastern sales manager, agricultural chemicals division. Mr. Julien will be located at Stauffer's eastern headquarters in New York, and will be responsible for inventory control of both raw and finished materials and consigned stocks.

* * *

The appointment of **Stanford A. Allen** as president of **Insecticidas Ortho, S.A.,** Mexican affiliate of **California Spray-Chemical** has been announced by **A. W. Mohr,** president of Calspray. Mr. Allen began his career with Insecticidas Ortho in 1952.

* * *

Escambia Chemical, Pensacola, Fla., has announced two changes: **J. Guy LaVergne** has been advanced to chief engineer and **Dr. L. H. Sutherland** has been made section head of their research program.

* * *

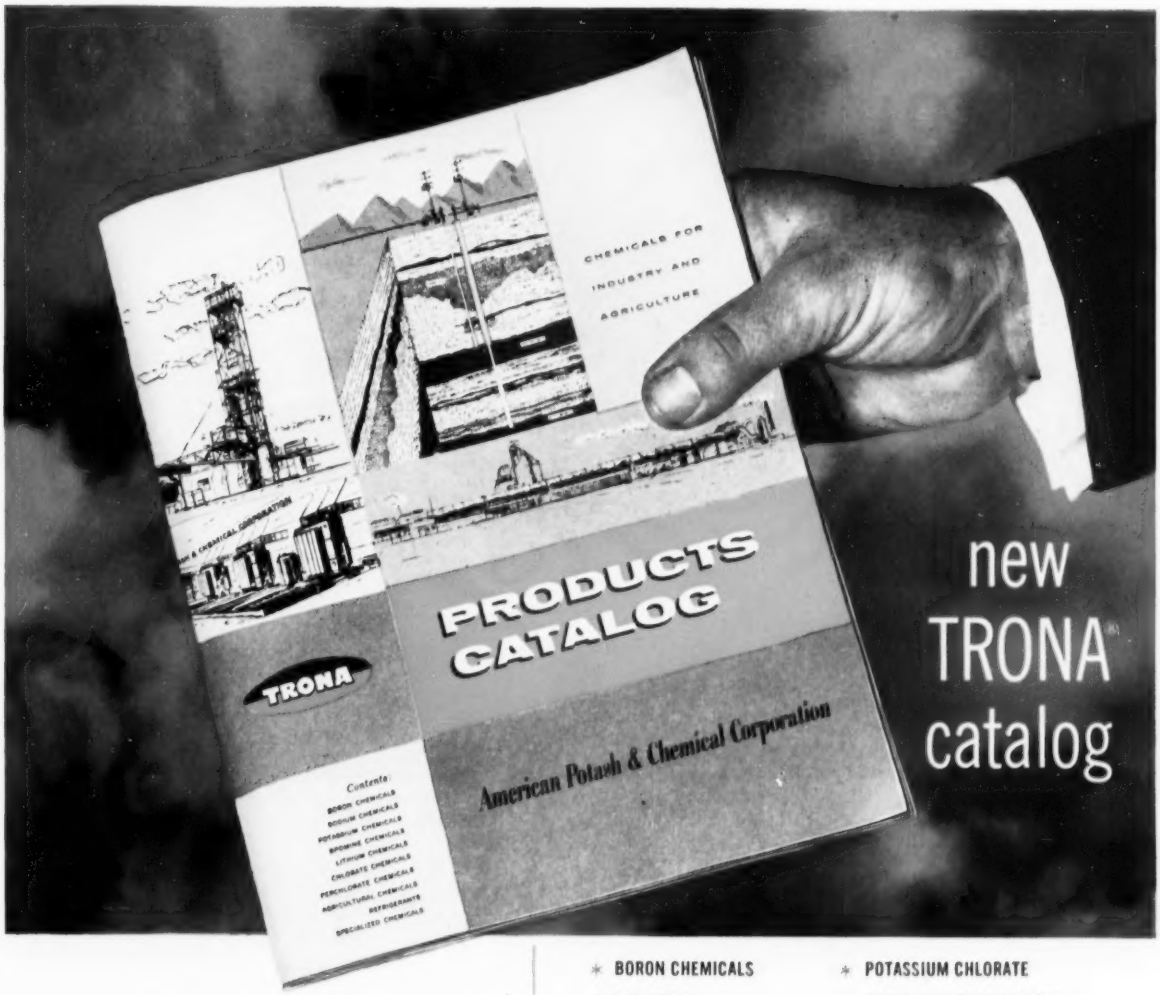
Dr. Louis L. Hallock has been made

Shelton Appleton, who has been transferred to the Peoria office of Potash Company of America, where he takes over the accounts served by F. H. Kennedy, who has become midwestern salesmanager, replacing vice T. E. Bradley, retired.

Thomas R. Cushing, elevated to salesmanager of Wilson & Geo. Meyer & Co., with Salt Lake City headquarters, where he succeeds John R. Foster, resigned.

John R. Thompson, who has joined the bag division of Virginia-Carolina Chemical as sales coordinator.

Reserved for you... Mr. Chemical Engineer!



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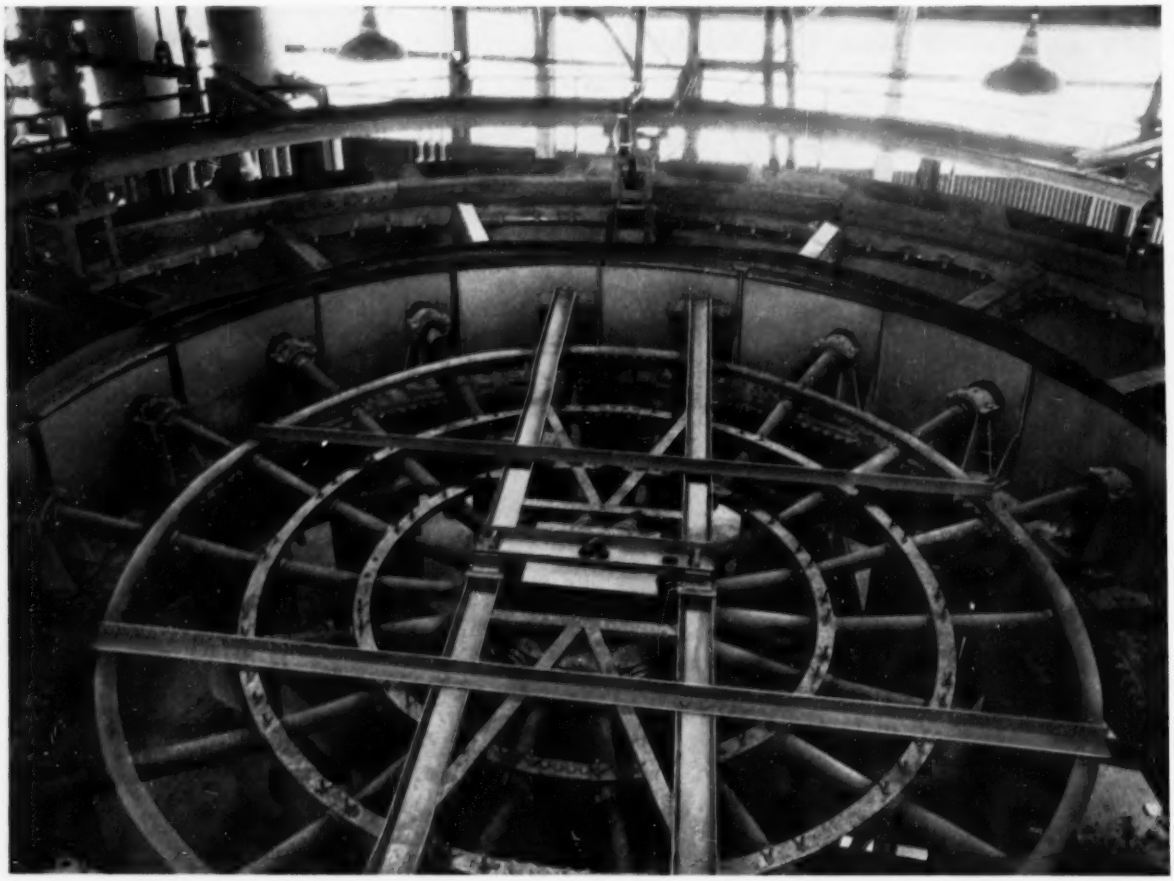

This is a section of U. S. Industrial Chemicals' new plant at Tuscola, Illinois, built to produce non-captive P_2O_5 solution . . . latest addition to the chemical-center where U.S.I. also makes ammonia, nitrogen solutions, and sulfuric acid for the fertilizer industry.

NEW U.S.I. PLANT GOES TO WORK FOR FERTILIZER INDUSTRY

. . . now producing 30,000 tons per year P_2O_5 as phosphatic fertilizer solution (wet process phosphoric acid)

You're looking at the giant filter in the first wet process plant built to supply you with phosphorus pentoxide in the form of wet-process acid. The entire production of U.S.I.'s new unit in Tuscola, Illinois is available for sale to mid-west fertilizer manufacturers, who for the first time have a source of P_2O_5 that is ample, economical, and dependable.

U.S.I.'s new equipment digests phosphate rock with sulfuric acid, and concentrates it to 54-55% P_2O_5 solution, ready to be incorporated in solid fertilizer formulations.

We are set up to serve you promptly. If more information on use of phosphatic fertilizer solution is your first need—or you'd like information on U.S.I. ammonia, nitrogen solutions, or sulfuric acid—your U.S.I. sales representative will gladly supply it. Write us. Or better still, phone.

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Division of National Distillers and Chemical Corporation

99 Park Avenue, New York 16, N. Y.

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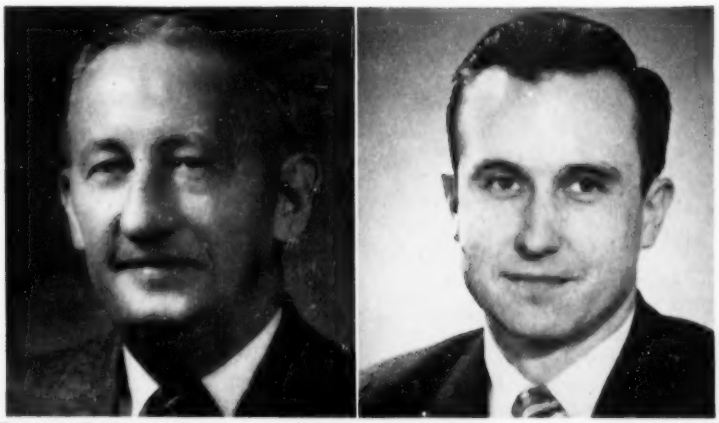

Anthony G. Grady (left), former chief entomologist at Sinclair Chemicals, Inc., has been appointed National Accounts representative for the firm's Nitrogen Products Division, with his headquarters at Chicago. Benjamin T. Anderson (right) has become Technical Service engineer for the Nitrogen Products Division, and will also headquarter in Chicago; he comes to Sinclair from Illinois Farm Supply Co. where he served as chief chemist, and later in the Research and Development Department, assisting in the development of the calcium metaphosphate mixed fertilizer process.

assistant manager of the market development department of **Commercial Solvents** and Rudolph DiGiacomo has joined the staff of that department.

* * *

The board of **Diamond R. Fertilizer,** Winter Garden, Fla., has elected **George M. Barley** vice-president. He will continue to serve as general manager. The other officers are: **L. Frank Roper,** president; **Bert. E. Roper,** vice-president; **W. Fred Roper,** secretary-treasurer.

* * *

Robert P. Rice has joined **American Potash & Chemical** as chief control chemist at the Henderson, Nev., plant, according to announcement by **John S. Vander Laan,** AP&CC administrative assistant at Henderson.

Rice formerly was chief chemist at the Jersey City, N.J., plant of **Columbia Southern Chemical.**

* * *

Hugh W. Sloan has been elected a vice-president of **St. Regis Paper.** He is managing director of their Canadian subsidiary and will continue in that capacity, but operating out of the New York home office.

* * *

Owen L. Nolan was honored by his colleagues at the Connecticut AES and others after completing a half century of analytical chemistry in the public service. He received a gold service pin with diamond, the first such award made by the Station Board of Control.

E. Robert Little, Jr., who has joined the expanded San Francisco district office of American Potash and Chemical as area sales representative.

* * *

Stanley de J. Osborne has been named president of **Olin Mathieson Chemical Corp.** and **Thomas N. Nichols,** former president, stepped up to the post of chairman of the board. **John M. Olin,** former board chairman, becomes chairman of the financial and operating policy committee and will also continue to serve as chairman of the executive committee.

OBITUARIES

J. Ed Anderson, 71, founder of Anderson Guano, Timmonsville, S. C., but retired, died May 7.

Walter Crady, organizer of North American Fertilizer Co., Louisville, Ky. in 1925, died May 4 after hospitalization since April 19, resulting from a fall.

Henry A. Huston, 99, who was the oldest living Purdue alumnus and who organized and headed the department of agricultural chemistry there, died May 10.

Leonard G. Mishoe, 59, owner of Santee Guano Co., Greelyville, S. C., and leading figure in the State, died April 8 after a year of declining health.

James A. Perry, 82, former president-treasurer of the Lawrenceville (Ga.) Cottonseed Oil and Fertilizer Co. and for 45 years Georgia Public Service Commissioner, died in Atlanta April 15.

C. Frank Sims, retired Virginia-Carolina division salesmanager died May 7 in New Jersey hospital after a long illness.

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Inefficient storage and handling of bulk materials runs costs up and production down. Let Marietta help you turn this cost factor into a profitable operation with a storage and handling installation engineered to the job.

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$ and ¢ in Safety

by W. D. Smith

Southern States Cooperative
Richmond, Virginia

Since a part of the material that I shall present is developed from our own operations and our own programs, I believe you should know that we, in Southern States Cooperative, have had an organized safety program for only about three and a half years. That doesn't mean that there hasn't been a considerable amount of interest in this subject. It just means that it's mighty hard for any one to do a job of this importance in addition to his other duties. . . .

Our own programs in safety have, we think, been fairly effective during the past three years. As all of you who have anything to do with such things know, it takes more than three years to develop the effort, the interest, the attitudes and the records to properly reflect the accomplishments or shortcomings of safety activity in a given organization.

The topic given me by your chairman developed into a puzzler, because of its very far reaching possibilities. I asked myself the question, "Does Mr. Lee want me to talk about:

a. Cost of a Safety Program?

b. Cost of the lack of a Safety Program?

c. What does an accident cost?

d. Safety Programs versus Workmen's Compensation premiums.

e. Safety Programs versus Claim Costs.

f. Direct and Hidden Costs of accidents.

or any number of items that might be listed as relative to Dollars and Cents in Safety." In thinking about this subject and how our own management might react, I decided that I should try to develop some of the accident cost factors facing industrial management today, and tell you something of what I think we must do in this field if our efforts toward accident prevention are to be reasonably successful.

In order that we may bring the subject properly into focus, I think that right now might be a good time for us to review some of the national facts concerning accidents and their costs. There occurred during 1955 a total of 93,000 accidental deaths and 9,350,000 injuries from all accidental causes. From statistics published by the National Safety Council, we know that of the accidental deaths, 14,200 were classed as work deaths, and that 1,900,000 of all the injuries were placed in the work category. This means then that work accidents accounted for about 1/6 of the deaths and a bit less than 1/5 of the injuries. What would your guess be as to the dollar cost of all the accidents in 1955? The folks who make it their business to know such things (National Safety Council) tell us that the accidents in which all deaths and injuries occurred, together with non-injury motor-vehicle and work accidents, and fires, cost the nation, in 1955, at least $10,300,000,000. The most important items making up this total are:

1.—(a.) Wage losses due to temporary inability to work; **(b.)** Lower earnings after returning to work due to permanent impairment; **(c.)** Present value of the future earnings of those totally incapacitated or killed in accidents. **2.** Medical fees and hospital expense. **3.** Administrative and claim settlement costs (actual payments on claims are included in wages lost and medical expense). **4.** Property damage in motor vehicle accidents. **5.** Property destroyed by fire. **6.** Property destroyed or production lost due to work accidents.

These are the terms used by the Council to describe the costs of accidents.

Now let's bring this item of accident cost a bit closer to our every day job and maybe the fellow who was sent to the hospital day before yesterday for a minor injury that may cause him to lose a day from work. The **Direct** costs are the medical and compensation costs of the accident, and these are the ones we hope to control through our Safety Programs. There are other items of cost, however, which are described as hidden or **Indirect** costs. These items often exceed the direct cost items. We in our organization don't know too much about the actual costs involved in these indirect items. In 1953 the American Management Association reported figures indicating that for each $1.00 paid under Workmen's Compensation, about $4.00 was required to handle the hidden or indirect costs. That figure is probably even higher now. The more or less familiar list of hidden or indirect costs is repeated in order that we may not lose sight of the costs involved, though the accident was minor: **1.** Time lost from work by injured employee. **2.** Loss in earning power or wages by the injured employee. **3.** Loss of income to the injured employee's family. **4.** Time lost by fellow workers of injured employee. **5.** Loss of efficiency by crew of which injured was was a member. **6.** Time lost by Supervision checking on accident. **7.** Time spent by clerks processing report forms. **8.** Cost of breaking in a new employee. **9.** Damage to tools, material and equipment. **10.** Time lost when damage tools or equipment are not in use. **11.** Production lost due to the accident. **12.** Overhead cost while work was disrupted.

Consideration of these twelve items described as hidden or indirect accident costs serves to confirm the statement that an accident is like an iceberg because so much of it isn't visible from the surface. We reach then two possible and quite logical conclusions and they are: **1.** Control of the direct costs through accident prevention automatically eliminates the indirect costs. **2.** There are no "little" accidents.

The material presented so far is intended to serve as background to re-emphasize the fact that we must make a greater effort toward our mutual problem of reducing work accidents and the resultant costs. There are two other points

Presented at Fertilizer Section, Southern Safety Conference, Richmond, Va.,

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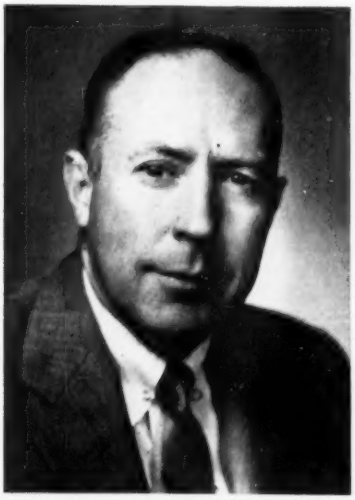

JOHN SPICER, JR., technical specialist for the southeastern states, with headquarters in Goldsboro, N. C.

OVE. F. JENSEN will serve manufacturers in the midwestern states, with headquarters in Maple City, Michigan.

PHIL B. TURNER will provide technical counsel for plants in the Northeast, and will work from Wilmington, Del.

These specialists on URAMON® Ammonia Liquors are ready to answer your specific formulating problems

Du Pont expands technical service to fertilizer manufacturers to aid in formulating today's complex mixtures with "Uramon" Ammonia Liquors.

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For further information on the formulations of UAL best suited to your use, and to request the services of this new specialist group, write:

HERE ARE OTHER IMPORTANT ADVANTAGES OF DU PONT URAMON® AMMONIA LIQUORS

- Safe in granulation . . . no danger of flash fires and less stack. Gives firm, uniform granules, which are best for storage and application.
- High-quality nitrogen from UAL resists leaching . . . supplies both urea and ammonium forms of nitrogen.
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- Prompt, dependable delivery enables you to schedule your production with confidence.
- Suitable for either batch or continuous mixing.

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which deserve your attention if our efforts in this direction are to be fruitful. First, it is absolutely necessary that we accept the basic fact that Industrial Accidents are not inevitable or unavoidable. How often have you heard it said that—"Well our operation is hazardous and we can expect a bad accident every now and then." In my opinion, this sort of attitude forms a perfect breeding place for the germs that will completely destroy the best safety effort. Second, but not necessarily less important in this discussion is "Interest in Safety Activity". I'm sure most of you are familiar with the following statement, or a like one,—goodness knows it appears often enough—"Safety Programs, to be effective, need the interest of top Management in all phases of planning and administration." This indicates pretty clearly that those who know are fairly positive that a good and effective program of safety must have "the" boss and not just "a" boss.

In many cases, we who work in the field of Insurance and/or Safety, lose the initiative in our programs by failing to show our top Management the effects of our programs on operating or production costs. I imagine most of us would agree that top management looks at these factors first in analyzing a monthly, quarterly, or annual operating and financial statement: **1.** Total production. **2.** Operation cost. **3.** Unit cost of production **4.** Net earnings.

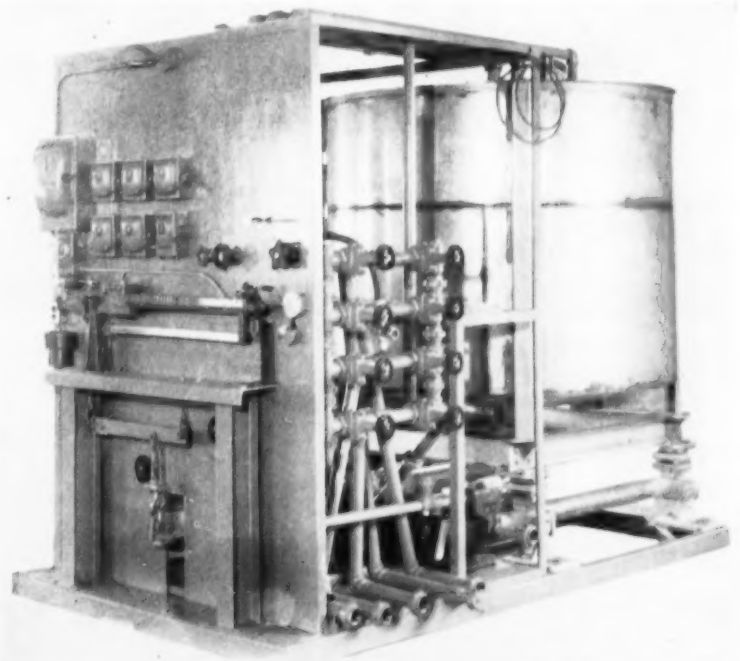
No doubt many of us have been questioned rather pointedly about how the unit cost of production got so high, or why total production was so low or what happened to the net.

Our management is no different from that of many other organizations who draw sharp conclusions, and make important decisions, on the basis of competitive report comparisions for a given period of operations. Yes sir, Dollar and Cents—management's yardstick for measuring progress. New, in today's operating reports the subject with which we are concerned is generally buried about middle way down the expense column under the heading "Insurance Expense". I know that most management recognizes increases and decreases under this item as caused by an increase or decrease in overall payroll requiring higher or lower premiums for Workmen's Compensation Insurance or an increase in fixed assets requiring more fire insurance on buildings or inventory. If we don't tell our management how these costs have been increased or decreased due to work accidents, we lose a chance to increase their interest in the subject.

Let's take a look now at Workmen's Compensation Insurance, which we carry for the protection of employees who may be injured while at work. This risk may be self-insured, or carried with a commercial insurance company or handled in a State Monopoly, depending upon the laws of the state in which a given plant is located. It should be remembered that no matter how you carry it, the net result amounts to paying your own claims, plus handling charges, with reasonable amounts going in reserve for known and unsettled claims as of a given date. When the rates are set by the state commission, they purposely include a loading to provide the insurance company with a return for the risk, and even at these rates, many companies report losses on their insurance. The actual cost varies greatly as rated by the different states. Consider the fertilizer industry, **in which I believe most of you are interested. . .**

We in our operations are familiar with the manual rates for Workmen's Compensation Insurance and from our records find it extremely difficult to justify the wide variation in rates for similar plants in different states. These rates vary from $1.49 to $3.93 on each $100 of fertilizer manufacturing payroll. Due consideration has been given the dfiferences (about 10%) in allowances made by the commissions in the various states and certainly this makes the wide spread in rates even harder to appreciate. Fortunately, indeed, for many of us, our organizations are large enough to handle our compensation insurance requirements through a self-administered program or on a retrospective basis with a commercial insurance company. Either of these practices or a combination of them, affords the opportunity for considerable savings in cost for this type of insurance, which is not available through the application of manual rates and individual experience adjustments.

As stated earlier, our program is new and in spite of the fact that we're showing some improvement in accident performance records, for our fertilizer plants, we can't say



Here is the new skid-mounted five-ton-batch liquid fertilizer unit being introduced by Indian Point Farm Supply. The plant, rated at 200 tons per day, can be purchased separately or complete with all storage tanks, plumbing and loadout lines, according to the manufacturer. Ingredients are weighed into the stainless steel tank, with potash and urea being introduced by a fiberglass cup elevator. All control valves for mixing, pumping to storage, or loading out spray trucks are within easy reach of the operator at the control panel, the designer points out. Complete data can be obtained by writing to Indian Point Farm Supply, Athens, Ill.

with any degree of conviction, that all the compensation rates are too high. The records available to us represent only a small segment of the fertilizer industry in the territory covered by Southern States Cooperative; therefore, what looks discouragingly high to us might appear mighty low to the rating authorities looking at the total industry performance for their state. Industry effort in safety performance remains the primary method of reducing the manual Workmen's Compensation rates for this or any other industry.

In feed mills we find the same wide variation in Workmen's Compensation rates, depending on locality. The most interesting thing about these comparisons, however, is that claims costs in our mills are higher than in fertilizer plants; frequency and severity rates are higher too; and so far as our own experience is concerned, here again only a small segment of the exposure, it would appear that mills should carry the higher rating, which is not the case in states where Southern States Cooperative operations are located.

Be that as it may, this is the way our Workmen's Compensation costs become a part of "Insurance Expense" on the operating statement. I am convinced that concerted effort on the part of all of us in the fertilizer industry can and will result in lower Workmen's Compensation Insurance Costs in all localities. Our accident direct costs records show cost per ton running from zero at one plant in 1956 to a high of .59 per ton in another plant in 1954. You can see very easily that a few cents on the Compensation rate might make a considerable difference in production costs per ton. By improving the accident records of the fertilizer industry, the rates for this necessary insurance can, and will, be sizeably reduced for everyone.

I say it's important for all of us in the fertilizer industry to improve our records in accident prevention in order to get these costs down. To make my point and emphasize the importance of industry effort, I want to quote a man all of you know, on a subject very closely related to accident prevention. Back in 1952, E. O. Burroughs of F. S. Royster Guano Company was speaking at the National Safety Congress on the subject of housekeeping and its relation to **capital** protection. He said, "In my state, the basic fire insurance premium rate on the type of plants commonly found in that area is 1½ per cent. Even at this high rate, insurance companies are reluctant to take the risk and many plants cannot secure full insurance. Bad housekeeping can increase the fire hazard to the point that losses in the industry will continue to mount and rates go beyond all reason. That high rate is not neccessary. Over the last twenty years with an average exposure of twenty frame plants, we have maintained a loss ratio of approximately .16 per cent. A similar record for the industry would materially reduce the fire rate." The principles of this statement are extremely significant to workmen's compensation insurance costs also and maybe appropriately used as justification for added accident prevention effort in the entire industry. We have improved our loss records, but the reductions in claims aren't yet showing up their full advantage for our operations.

The Dollar Sign $ goes a long ways with management. A little ways back we spoke of the four things our management would most likely look for in first examining the operating statement. They were:

Triangle Brand Copper Sulphate has been recognized as an effective agricultural chemical for more than sixty years. In sprays (where Bordeaux mixtures are the most reliable), **in dusts (if you prefer them)** and in fertilizers (for additional enrichment of the soil) Triangle Brand Copper Sulphate has proved itself worthy and dependable. Try these Triangle Brand forms of Copper Sulphates:

INSTANT (powder) for quick and efficient mixing or Bordeaux sprays.

SUPERFINE (snow), SMALL or LARGE CRYSTALS, all containing 25.2% metallic copper.

BASIC Copper Sulphate in powder form, containing 53% metallic copper.

Write for booklets that will help you solve your agricultural problems.

Control **POND SCUM** and **ALGAE** with Triangle Brand Copper Sulphate. Write today for information on how it can help you maintain healthy water conditions.

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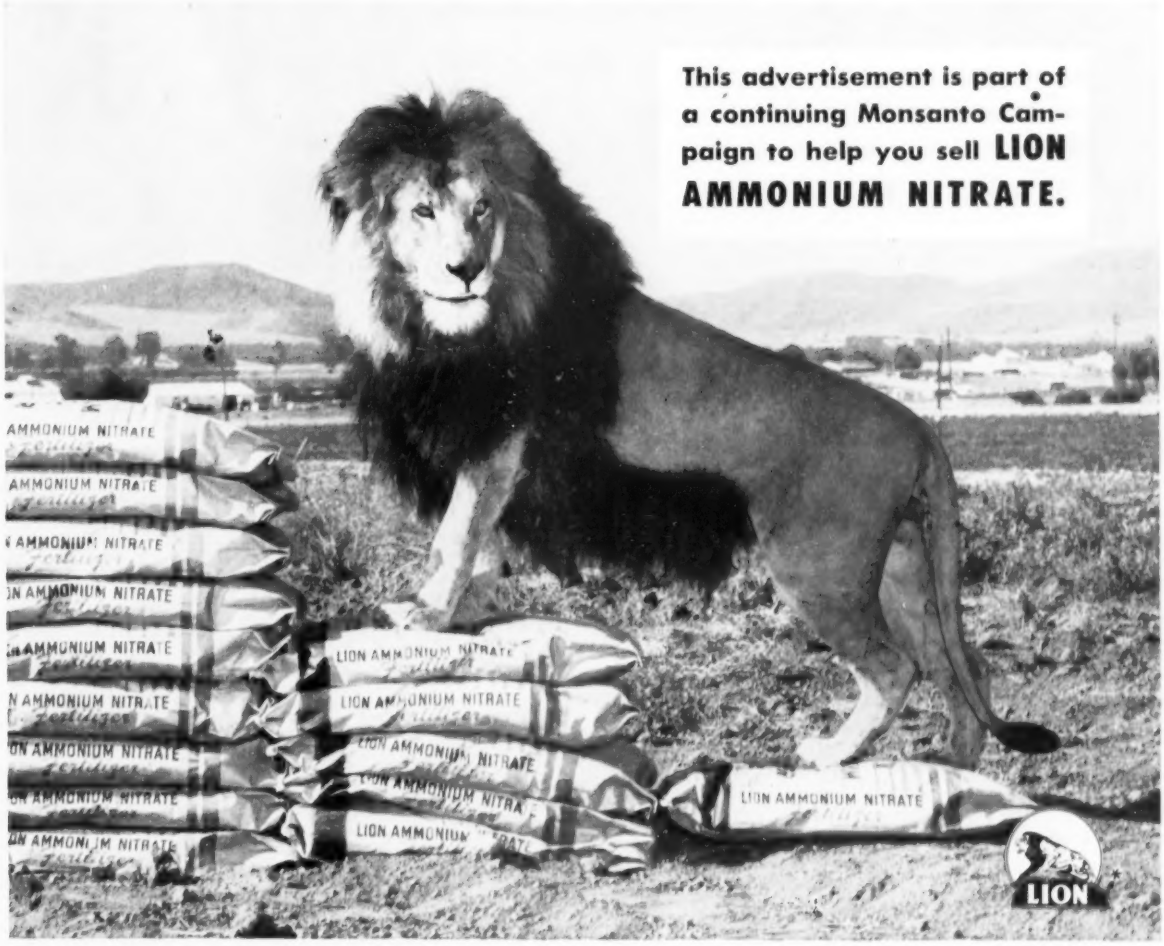
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You save money with LION in your fields

LION BRAND AMMONIUM NITRATE IS MORE ECONOMICAL THAN NITRATE OF SODA OR AMMONIUM NITRATE–LIMESTONE CARRIERS

FOR LOW-COST NITROGEN, LION Ammonium Nitrate is the brand. Guaranteed to contain 33.5% nitrogen, LION is . . .

- **Far more economical** than nitrate of soda, which contains only 16% nitrogen. You get more than *twice as much* of the valuable plant food, nitrogen, in every bag of LION brand Ammonium Nitrate than you do in any bag of nitrate of soda.
- **A better buy** than 20.5% ammonium nitrate–limestone carriers, LION gives you *better than* 50% more nitrogen in every bag.

FOR EASIER SPREADING, Lion Ammonium Nitrate is in pellet form. These pellets are specially coated to withstand caking . . . then packed in specially lined, moisture-resistant bags. Result: LION brand is *guaranteed* to flow freely—*not for just a year, but until used*—when you follow storage directions on the bag.

3 EASY STEPS TO GET ALL THE FEEDING-POWER YOUR CROPS NEED

1. TEST YOUR SOIL to see what kinds and amounts of fertilizers are needed. Your local farm authorities will help.

2. ORDER WHAT YOU NEED of mixed fertilizer and Lion brand Ammonium Nitrate from your fertilizer dealer. When you buy LION, you get top-quality, low-cost nitrogen fertilizer *guaranteed* to flow freely; *guaranteed* to contain 33.5% nitrogen.

3. APPLY THE FULL AMOUNT of mixed fertilizer and Lion brand Ammonium Nitrate soil tests indicate. Don't skimp—fertilizer is the least expensive item you use for crop production.

GROW MORE PROFITABLY . . . Weed Killers • Brush Killers • Parathion Insecticides • Meta-Green® to keep silage fresh • Phosphates (liquid and solid) • LION Sulphate of Ammonia • Anhydrous Ammonia.

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Table 1. Claim Summary, Southern States Cooperative, July 1, 1955 - June 30, 1956.

Department	W. C. Claims	Auto Col.-F&T	Liability Auto	Liability Comp.-GPL	Totals All Lines 1955-56	Totals All Lines 1954-55	Totals All Lines 1953-54
Management Service (128)	$ 8,084.91	$ 708.25	$ 8,176.41	$11,630.15	$28,599.72	$29,051.16	$58,909.74
Coop. Mills (6)	14,607.84		101.61	4,392.60	19,102.05	15,570.34	16,281.25
Coop. Fertilizer (7)	7,665.12		48.95		7,714.07	16,316.63	15,847.93
Coop. Seed & Farm* (10)	3,835.38	416.25	213.29	22.46	4,505.38	15,313.55	8,911.25
S. S. C. (Note)	239.52	234.38	1,027.01	53.50	1,554.41	1,345.39	41,086.38
Grain Marketing (3)	27.00				27.00	113.00	134.25
S. S. Marketing (2)	11.00	37.94	360.67		409.61	2,335.71	1,227.50
Petroleum Services (31)	968.24	5,082.67	2,021.27	172.65	8,244.83	6,199.26	4,447.99
TOTALS (1955-56)	$35,439.01	$ 6,479.49	$11,937.21	$16,271.36	$70,157.07		
TOTALS (1954-55)	$41,928.95	$ 5,738.36	$30,094.13	$ 8,483.60		$86,245.04	
TOTALS (1953-54)	$42,732.44	$ 6,931.45	$48,915.60	$48,266.80			$146,846.29

Note Includes: 1. S. S. Hdq. Bldg.; 2. Truck Transportation.

*Includes Hybrid Corn Service (2)

Table 2. Workmen's Compensation Claim Analysis for Fertilizer Plants

	1954		1955		1956	
	Claims Paid	Cost Per Ton	Claims Paid	Cost Per Ton	Claims Paid	Cost Per Ton
PLANT A (1)	$ 1512.	.014	$ 2342.	.021	$ 6017.	.055
PLANT B (3)	1922.	.069	9630.	.26	56.	.001
PLANT C (4)	20.	.0008	56.	.002	62.	.002
PLANT D (2)	39.	.0003	525.	.006	180.	.002
PLANT E (6)	26.	.0018	584.	.032	N.C.	
PLANT F (5)	11834.	.59	3176.	.13	1349.	.041
	$15353.	.059	$16313.	.053	$ 7624.	.024

(All figures are for year ending June 30 and account for about 575,000 man-hours exposure per year.)

1. Total production 2. Operating cost 3. Unit cost of production 4. Net earnings.

Three of those items carry the dollar sign and maybe all four of them, depending on how total production is expressed. Of these four items, two are cost factors directly effecting total production and net earnings. Doesn't it naturally follow that management would be interested in another set of figures, preceded by the dollar sign $, that have a definite effect on the net earnings of the company? With this thought in mind, we have, for the past three years prepared a Claim Summary Report showing how many $$ dollars were involved in Claim Settlement at each of our manufacturing and warehouse locations. (See Table 1.) This is a report to top management and I'm thankful to say that there has been a sizeable improvement in in claim cost both in our self-insurance program and that carried commercially. It's been gratifying to have members of management ask, "How much will our insurance costs be reduced by our improved claim cost performance?" This report has done two things for us the top management level: 1. It maintained an interest that can't be held any other way because it is expressed in management's own terms — "Dollars and Cents." It has developed a competitive situation between operating departments which did not heretofore exist.

We hope that the total claim figures for the three years are the beginning of a trend. On the basis Claims, the overall picture hasn't of the Workmen's Compensation changed to indicate just what the result for this twelve month period may be, though the indications for the first six months are favorable.

The Dollar Sign $ goes a long way with local management and supervisors too. The report to management breaking down the claim costs for operating departments goes to all branch and plant managers showing just how their unit compared with the other branches or plants in their department. (See Table 2.) This poster goes a bit further than the report of claims has been carried, heretofore and shows, in addition to Workmen's Compensation Claim Costs for each year, the Claim Cost per ton. It may be that this will be included in future claim summaries though at this point I'm not sure. From this chart you can see we definitely have some problems in fertilizer manufacturing in spite of the sizeable overall improvement in claim costs for 1956. Plants A & F are the problems of the moment. Through December 31, 1956, plants A & F had only one lost time injury each for the first six months of the current year, and all plants report only a total of four lost time injuries. I point out at this time, for your recognition, the fact that the claims cost figures shown reflect only the insured expense (Direct Costs) (Compensation and Medical). Remember the 4 to 1 ratio used earlier for comparing direct and indirect costs? Certainly this gives added emphasis to the necessity for more effective accident cost control, thereby eliminating this hidden cost expense of every accident, borne by the company, and not fully realized.

During this current year, we're doing better on our frequency and serverity rates in fertilizer plants. Frequency is 18.6 and severity is .19 (190 days) for the six month period through December 31, 1956. This compares much more favorably with the last published industry figures than our record for last year. For the year ended June 30, 1956, we had a frequency rate of 30.5 and a severity rate of .33 (332 days); industry rates for 1955-56 were 11.41 and 2522 days.

At all location, the managers hold meetings on production or operations periodically and in addition to the operating factors commonly discussed, they examine claim costs, frequency and severity rates (quarterly reports) on accidents and de-

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termine the course of action necessary to maintain or improve their records. (See Table 3.) . . .You will note that I have calculated severity rate on the new basis for the purpose of this report only. Normally the 1,000 hour formula is used. In this respect, industry for the last year lost 2,522 days for each 1,000,000 hours of exposure, or 2% of all hours worked.

I've had requests from supervisors, wanting to know costs on certain accidents in order that the actual cost might be made known to those concerned. We believe that managers, supervisors, and employees alike can understand the significance of these Direct Costs (Medical and Compensation) resulting from accidents and that this understanding contributes direction to their safety effort.

All industry today, not just our industry, is placing emphasis on "Cost Reduction" in Manufacturing, processing, and distribution costs. This means that a program of accident cost reduction is a "must." This significance will be greater in plants where, through good management practices and plant layout, present operating costs are at reasonable minimums.

In order to comply with this requirement for accident reduction, it is necessary to face this well established fact — profitable production is the goal of every plant. We must recognize too, that reaching that goal depends largely, on the effective use of manpower, materials and equipment for one common purpose. Any interruption in the working of any of these three elements tends to impair the desired flow of production.

Practically every accident hinders, to some degree, the performance of these three component parts of production. We must, therefore, conclude and impress all concerned with the fact that safety is co-incident to efficient economic production. Since we are all aware of management's keen interest in the cost of production and their mandate that such can be reduced to the lowest practical level, I believe now is the time to develop and hold additional management interest and support in our Safety Activity. This can be done by sharpening their interest in that financial statement item "Insurance Expense." The comparison of claims to premiums in the Workmen's Compensation field is recognized to be ineffective except where loss experience is particularly favorable and then, the automatic reaction is, why don't we buy our insurance "cheaper." Therefore to inform our management, we must develop the costs of accident factors, not covered by insurance. Such an analysis must include at least: **1.** Lost manhours due to injuries; **2.** Current cost of injuries; **3.** Methods used to reduce lost manhours and costs; **4.** Actual cost of damaged machinery, parts, material or finished product. Perhaps some of you are already applying this approach to the collection of cost data.

To summarize briefly, let's agree to recognize our accident costs for what they are—Production Costs—that can and should be priced in Dollars and Cents. When we get ourselves into a frame of mind to permit this recognition, we will find that accident costs will lose the "intangible" tag that has been applied to this operating factor for so long. We can then develop an accident cost analysis that will reflect a reasonably true picture of what our industrial accidents cost our companies in Dollars and Cents, and manhours lost.

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Table 3. Cooperative Fertilizer Service Safety Standing—Six Months Ended December 31, 1956 and Two Years Ended June 30, 1956.

Plant	Current Quarter Oct.-Nov.-Dec. No. of Non Disabling Injuries	Current Quarter Oct.-Nov.-Dec. No. of Disabling Injuries	Current Quarter Oct.-Nov.-Dec. Time (days) Chg. for Disabling Injuries	Six Months No. of Disabling Injuries	Six Months Time (days) Chg. for Disabling Injuries	Six Months Total Man Hours	Frequency Rate 6 Mos. Ended 12/31 1956	Frequency Rate 6 Mos. Ended 12/31 1955	Frequency Rate 2 Yrs. Ended 6/30 1956	Severity Rate 6 Mos. Ended 12/31 1956	Severity Rate 6 Mos. Ended 12/31 1955	Severity Rate 2 Yrs. Ended 6/30 1956
D	3	1	2	1	2	53,222	18.8	P	26.9	.04	P	.48
E	0	0	0	0	0	14,352	P	P	P	P	P	P
X	0	0	0	0	0	3,948	P	P	P	P	P	P
B	0	1	1	1	1	18,391	54.4	P	20.2	.05	P	.28
A	1	1	35	1	35	84,737	11.8	34.5	18.9	.04	.24	.44
F	1	0	0	1	3	22,251	44.9	98.2	69.3	.13	1.03	.71
C	0	0	0	0	0	18,696	P	54.1	21.8	P	2.7	.75
TOTAL	5	3	38	4	41	215,597	18.6	28.2	23.3	.19	.13	.38 *
										190.	221.	223 **

P—Perfect *Old Formula **New Formula

Frequency Rate—Number of injuries which resulted in lost time beyond shift on which injury occurred, per one million man hours of exposure.

Severity Rate—Total time charged in days per 1000 hours worked.

National average for this industry (1955-1956): Frequency Rate—11.41; Severity Rate—(2522 days)**

I'm sure that the claim cost figures that I have used in the Southern States Program, and illustrated briefly to you, have been of considerable help. I like to think that the 52% improvement we show in claim cost (excluding fire) didn't just happen. I believe that the application of Dollars and Cents to our program has made a definite contribution to this improved performance. This means to me that an affirmative approach (the business man's approach) to safety can be made through the application of a system of Dollars and Cents reporting of accident cost data. Our accident control programs will then assume their proper station among the operating factors considered by management.

Knowing that our busy top management and plant executives today use the financial and operating statements as their first line of communication, it seems quite appropriate that the safety or accident record be interpreted in dollars and cents for use as a supplementary part of the statement. I'm convinced that the time, and money, and effort that goes into applying this approach will pay dividends—by getting the executive determination to stop accidents. I will be the first to admit that this, in most cases, is a long range program. The records show, however, that it's high time we get started.

AP & C Offers Safety Trophy

American Potash & Chemical Corporation has inaugurated a company-wide safety contest in which the various AP&CC facilities will compete for a newly-established President's Trophy.

The contest was formulated under the sponsorship of AP&CC President Peter Colefax to continue the company's outstanding improvement in safety during recent years, according to announcement by Robert B. Coons, vice president, administration.

Indicative of AP&CC's efforts toward plant safety is the fact that the company and its various plants have received more than 10 safety awards during 1955 and 1956, including the Lammot du Pont Safety Plaque, the highest safety award in the chemical industry.

The contest will be conducted on a quarterly basis among various AP&CC facilities; judging will be done on a point system including such points as calendar days worked man hours, frequency rate, severity rate and others. The point system was set up to permit equal competition between large and small facilities.

Swift Reaches Fine Safety Record

The Plant Food Division of Swift and Company has developed an outstanding safety record during the first three months of their 1957 fiscal year compared with 1956.

Out of a total of 27 plants working 873,696 manhours, there were no disabling injuries. These plants, for that period, have an accident frequency rate of zero.

For a similar period in 1956, the same plants had an accident frequency rate of 9.50.

NPFI Agronomy Awards At U. of Ky., N. C. State

David Lee Terry, a junior at University of Kentucky, has been awarded the National Plant Food Institute's $200 Agronomy Club Scholarship.

Howard Gordon Small, Jr., rising senior at North Carolina State College, was the 1957 winner of the college's Agronomy Achievement Award including $200 in cash and an engraved plaque.

Presentations were made by NPFI's Dr. W. H. Garman at Kentucky and Louis H. Wilson at North Carolina.

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WINNERS OF NPFI SAFETY PRIZES ANNOUNCED

A contest was sponsored by the Fertilizer Section of the National Safety Council with the cooperation of the National Plant Food Institute which contributed $500 in cash prizes. Any employee of the fertilizer industry was eligible to enter the contest, provided that the entry requirements were met.

These requirements were (1) a picture of any device, improved equipment, tested operation, or a better and safer way of doing a job, and (2) each picture had to be accompanied with an explanation covering; the original unsafe situation; what was done to correct the unsafe situation; and an explanation of the results obtained.

The first prize winner received $50, the second prize winner $30, and the third prize winner $20. Forty honorable mention prize winners each received $10. Some employees submitted more than one entry and some received more than one honorable mention prize.

Ned Dearborn, President of the National Safety Council, was Chairman of the Committee of Judges.

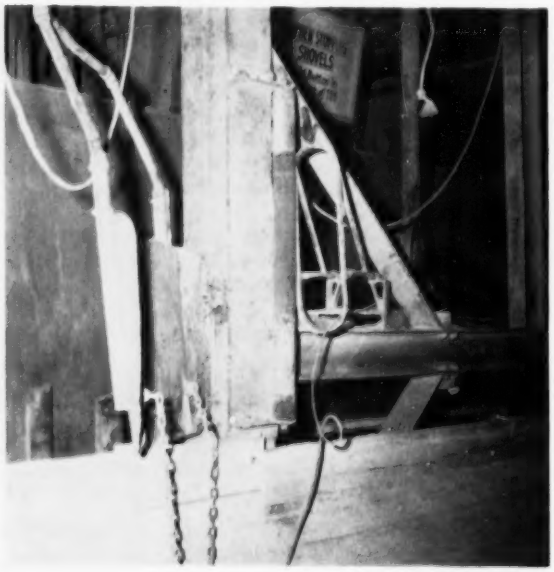
First Prize—$50

Gordon W. Pittock, William Stone Son's Company, Ltd., Ingersoll, Ontario, Canada.

The company"s automatic grain shovels have been equipped with safety sheaves. These automatic grain shovels are used to scrape bulk fertilizer materials from box cars into a hopper system below the railway siding.

This safety device disconnects the power supply to the grain shovel and immediately reverses the direction of the motor, should any part of the employee's body which has become entangled in the cable come in contact with the loop on the safety sheave.

First Prize Award—Picture No. 1



There have been a number of instances where limbs have been lost because these shovels lacked such a safety device.

One of the most important functions of this safety device is that it not only disconnects the power supply but also reverses the direction of the motor, giving immediate release to the cable.

Second Prize—$30

P. W. Giddings, Spencer Chemical Company, Pittsburg, Kansas.

The manual bag operation made use of a heat sealer to weld polyethylene tubing. This machine makes use of electrically heated sealing bars. The sealing cycle is automatically controlled as to time and pressure.

The end of the polyethylene is placed between the bars manually, and the sealing cycle is actuated by an electrical switch.

Originally, this electrical circuit was energized by a foot switch. With such a hazardous set-up, it could be easy to actuate the switch inadvertently while the finger was between the bars. In such an instance there would be no way of releasing the bars until the heating cycle was completed.

To remove this hazardous set-up, the foot switch was removed, and two micro-switches in series were installed. This safety installation makes it necessary to use both hands to energize the circuit.

Third Prize—$20

H. J. Miller, Southern States Phosphate and Fertilizer Co., Savannah, Ga.

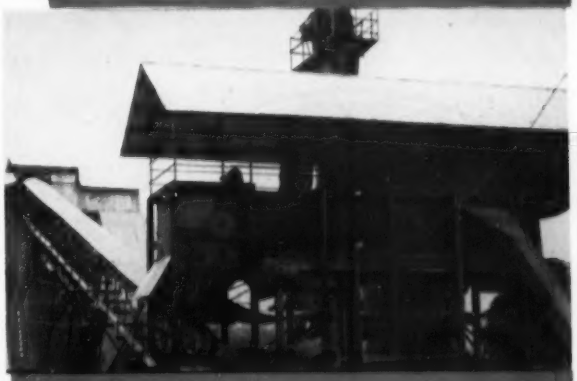
Original set-up: a belt conveyor is used to feed the scale hoppers in the dry mixing department of this plant. To move this 72-foot conveyor from one hopper to another, a ¾" rope was anchored in the direction in which the conveyor was to be moved.

The rope would be looped around the winch head a few times and when the slack was taken up, the winch would move in one direction. If the center of the hopper was overshot, the operator would have to take off his rope and anchor the opposite end in the other direction. He would then loop it over the winch head to tighten and reverse the direction of travel.

This method was used for years even though diffi-

First Prize Award—Picture No. 2

DAVIDSON-KENNEDY COMPANY



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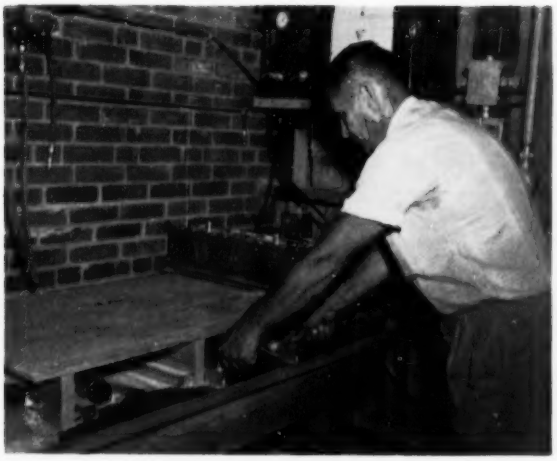
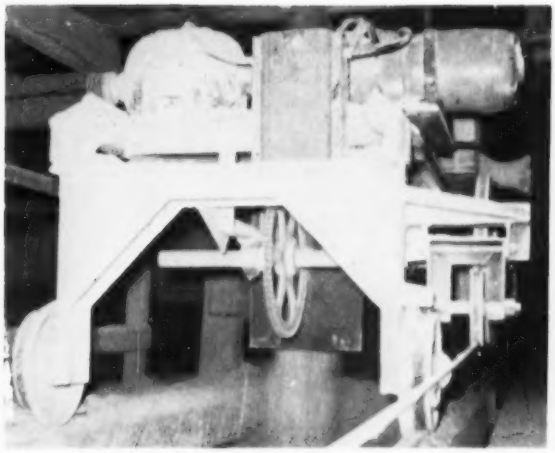


Second Prize Award



Third Prize Award

culties were encountered in centering the conveyor over the hopper; time was lost in reversing the direction; and material was lost or mixed in the wrong hopper.

After a serious accident, it was decided that something would have to be done to prevent a recurrence. After considerable thought, Mr. Miller developed an electrically powered conveyor mover with remote control. Now the operator can stand in one place and by the flick of a switch move the conveyor in either direction, control the directional flow of the material, or if he so desires, stop the belt. The operator now has complete control with a minimum of danger to himself.

APPLICATION TO FERTILIZERS OF MASKING AROMATICS

The application of aromatics to commercial fertilizers is a fairly recent development, but appears to have an excellent future. Here, as in so many industrial applications, the problems involved are twofold . . . namely masking and reodorizing. Commercial fertilizers' two basic forms, solid and liquid, each present a particular odor problem.

One of the most frequent difficulties encountered is in the manufacture of soluble phosphate fertilizers. . . . In the manufacture of soluble phosphate fertilizer by wet process, powdered phosphate rock is treated with sulphuric acid, and it is at this point that the odor problem begins. The acid is heated and poured on the rocks, with resultant highly unpleasant fumes. It has also been found, by a number of manufacturers of similar products, that after this odor has evaporated another, equally unpleasant, develops, and stays in the finished material. The latter odor has been described variously as reminiscent of sewage, or burned garbage.

Work has been done on this problem for a number of concerns by the D&O Labs, and it has been found most satisfactory to mask the sulphuric acid. Odorants have been developed that will do the job, successfully, in proportions of as little as .02 percent.

Price is always an important factor in industrial perfuming, due to the large quantities of aromatic materials usually required, and it is essential that the products developed be as inexpensive as possible. All the odorants developed for fertilizer purposes in the D&O Labs do conform to this important cost factor.

Organic Masks

Organic fertilizers, of course, have been notorious for years for their highly unpleasant odors. Like so many other products however, centuries of use in their original form, although in no way mitigating the smell, had generally innured the consuming public to an acceptance of its inevitability. With the advent of "the fragrant life," however, into merchandising circles at all levels, even the venerable manure type fertilizer has been subjected to an olfactory overhauling. Again, in the D&O Labs, masking odors have been developed for manufacturers of fertilizers made up of bases such as dried blood, sewage sludge, animal manure, etc. Such oils can be used in proportions of from .05 percent to .02 percent and price is kept well within the manufacturer's allowable cost.

Aromatics for Reodorizing

While the liquid phosphate type of fertilizer almost always presents a masking odor difficulty, nitrogen-based products usually carry a mild non-obnoxious scent. The same is true of a number of mixed fertilizers, some of which may already have had ingredients deodorized prior to mixing. The D&O Labs have received a number of requests, in such instances, to provide an appropriate scent to these essentially odorless substances. The odor of rich moist earth, of partially decomposed barnyard manure or of humus or peat have been requested as well as the scent of new mown hay or a stable odor.

Anything that might indicate a farm environment is ordinarily ac-

ceptable for this purpose. Compounds developed can often be employed in proportion of from .1 to .3 percent, and may be added to the fertilizer direct, or if this is economically or otherwise unfeasible, incorporated into the bag or package. Here we have what might be called perfume in reverse, yet the sales psychology involved is quite simple.

The barnyard odor has, for centuries, been associated with the fertilizer that brings soil fertility and good crops. It was not unnatural for some farmers to hold the new, odorless chemical products somewhat suspect. On the other hand, the odor of sulphuric acid was neither pleasant nor traditional, and many other growers undeniably preferred the odorless material to that reminiscent of burned garbage. Particularly for lawn and suburban garden use, the odorless fertilizers and plant nutrients are preferred. In either instance, masking, reodorizing or both, the services of the industrial perfumer are indispensable.

Trends for the Future

As to the future of the industry itself, so long as the human race must eat the produce of the earth, fertilizer will play its increasingly essential role. . . . Increased use is expected on grass or forest covers under the soil conservation programs, and more intensive application is expected to the land under cultivation. . . . And with it all, the influence of "The Fragrant Life" will continue to be felt so that both those who desire odorless products and those who prefer the familiar "farm-yard" scent will be equally satisfied by the variety of products on the market.

THE ODOR BUSINESS

As suggested by this article, from D&O News, house organ of Dodge & Olcott, the masking of odors, and reodorizing of products is a big, new business, and growing.

Scientists specializing in odor control have developed thousands of odor pairs which neutralize one another. These laboratory-developed counteractants have been practically applied to solve some of the most fantastic odor problems imaginable. Sample problems include: removing garlic odors from phonograph company recording studios; freeing circus tents of animal smells, removing stench bomb odors from businesses attacked by hoodlums, and deodorizing hotel rooms after tear gas had been used to quiet over-zealous guests.

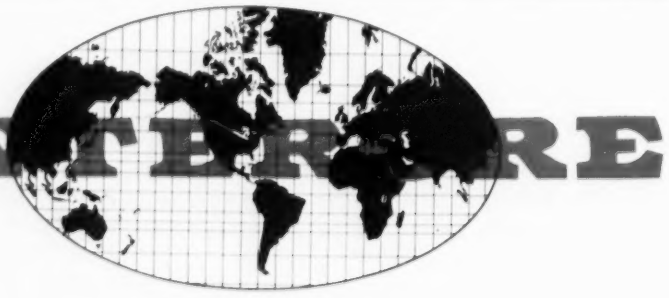
Haveg Now Builds Tanks Within Tanks

By using newly developed techniques, Haveg Industries, Inc., can convert worthless old tanks into usable systems, according to Dr. John H. Lux, president of the Wilmington, Del. company.

The tank-lining resin plastics employed will resist nearly all commercially encountered chemicals including acids (even hydrofluoric), alkalis, and most organic liquid.

The lining of tanks by field molding or cementing can mean substantial savings because (1) the cost of the tank is less, (2) the need for razing the original tank is eliminated, (3) where tanks are inside buildings, there is no need to make changes in the building's structure to permit the entry or removal of large tanks, and (4) many old industrial tanks contain fumes and corrosive chemicals of an unknown nature. Any use of welding in or around such tanks could result in explosion or accidents; however, this danger is practically eliminated when a tank lining is molded of plastic resin. Tanks up to 55 feet in diameter have been lined, it is reported.

A second method of field construction makes it possible for Haveg to construct completely new plastic tanks inside buildings. More information on the field lining of existing tanks or in-plant erection may be had by contacting Haveg Industries, Inc., 900 Greenbank Road, Wilmington 8, Del.



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Canadian Producers Meet July 10

Plant Food Producers of Eastern Canada will assemble for their Twelfth Annual Convention July 10-14 at the Manoir Richelieu, Murray Bay, Que. The group will leave Montreal July 9 and arrive at Murray Bay the following day.

New I & C Sewing Head Cuts Costs

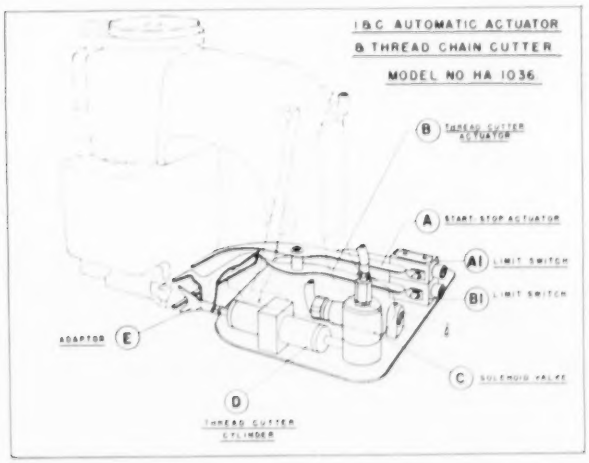
A new sewing head attachment that makes possible savings in both labor and material has been announced by Union Bag - Camp Paper Corp. Called Union's I & C Acto-Cutter, this attachment automatically starts and stops the sewing head and also cuts the thread chain between bags.

Field experience shows that the use of the Acto-Cutter reduces the "human element" in sewing to a point where an inexperienced operator may be used. The attachment also makes it possible for one operator to easily perform the combined operation of carefully forming the bag tops and then feeding the bags into the sewing head, according to the manufacturer.

Another advantage of the Acto-Cutter is that it reduces torn, unsightly and irregular sewn closures to a minimum. It also saves a considerable amount of thread as thread tails are reduced to an absolute minimum on the leading edge of the bag and to one inch on the trailing edge. Finally it cuts the cost of wasted bags, refills and clean-up time.

Designed for use on the Union Special 80600E Sewing Head, The Acto-Cutter is available in two basic models.

When bag is inserted into the sewing head, the start-stop actuator (A) depresses the limit switch (A1). This closes the electrical circuit to the motor starter and thereby energizes the sewing head motor. As the bag is fed through the sewing head feed mechanism, the thread cutter actuator (B) depresses the limit switch (B1). This closes the electrical circuit to solenoid valve (C) which controls thread cutter cylinder (D) and causes adaptor (E) to retract permitting passage of the bag. The machine will continue to sew until trailing edge of bag releases actuators (A and B). At this instant the thread cutter cylinder (D) is energized causing adaptor (E) to extend guiding thread chain into the sewing head cutter. The motor (or clutch) is de-energized causing the sewing head to stop. The entry of succeeding bags at a space interval of not less than three inches will cause the sewing head to cycle continuously and will permit a cut-off operation on each bag.



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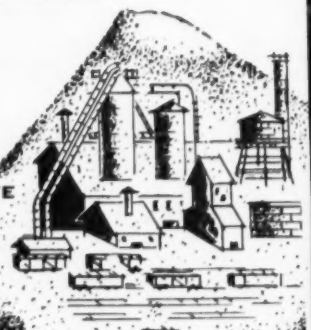

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Fur-Ag is readily available ... inexpensive, produced in volume, shipped to you on schedule 12 months a year. Among Fur-Ag's many advantages: reduces bag set, speeds up curing in the pile, provides bulk, sterilized—free from plant diseases, insects and weed seeds. Fur-Ag's dark, *natural color* helps make a rich-looking product. Write today for Bulletin 127.

The Quaker Oats Company
CHEMICALS DEPARTMENT
345 The Merchandise Mart, Chicago 54, Illinois

Random NOTES & QUOTES

Joke: A crop inspector asking questions in the hills: "Do you people have trouble with insects getting into your corn?" Replied the farmer—"We sure do, but we just fish 'em out and drink it anyhow." Down South the inspector would have been shot before getting that far; which we should be for going this far.

O

Second gear: At a recent feed dealer meeting, 600 people heard four Nitrogen men do a little predicting, the essence of which is that the fertilizer industry is only in second gear.

O

Incentive is diminishing to the point that the extra effort which made this land great is almost a thing of the past. This serious indictment, really an indictment of management and government, was part of a talk to the Economic Club of New York, by Dupont's Crawford H. Greenewalt. Mr. Greenewalt, by the way, was recently impersonated on TV in a dramatic presentation of the day Atomic Power was first demonstrated. Here's a line from that speech, which we can't resist: "Tranquilizing of incentives can scarcely foster progress . . . one cannot recommend Miltown as a substitute for incentive or Equanil as an alternate to achievement."

O

Soil testing has more and more advocates. Come recent word from Ohio that farmers in that State, not too long advocates of good management programs as we know them, are showing the results of 7 years of work by the State laboratory. This past March the soil samples sent in almost doubled those of the previous March.

O

Rhea Blake, Cotton Council v-p, says that the cotton industry has been so busy treating short-term ailments it hasn't had time to tend to its basic needs . . . such as adequate programs of research and sales promotion. Only by paying some attention to these two vital points, he feels, can cotton hope to secure its prosperity for five to twenty years in the future.

O

Dr. Ray Koon director of U of Mass Waltham Field AES has a book, published by Little, Brown & Co. which answers such down-to-earth questions as "Why don't my seeds germinate." With the home garden becoming a four billion dollar market, it might be well for fertilizer salesmen to read this book, and pass some of its wisdom along to dealers.

O

General Chemical division of Allied Chemical & Dye has a new granular herbicide to control weeds for long periods, sometimes as much as 10 months. It is called Urox and will be available soon. It is intended primarily for non crop areas.

O

American Cyanamid has had its malathion registered for use against the boll weevil.

O

1958 seems a sure year for a complete overhaul of Federal farm programs. We hope they will be brave enough then to do something economically sound, though politically suicidal, but we remember that 1958 is a Congressional election year.

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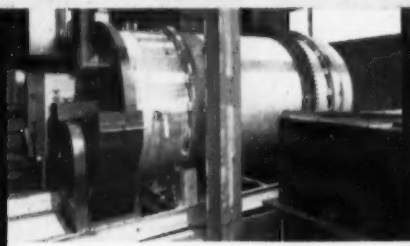
▸Elevators
▸Granulators*
▸Conveyors
*TVA Licensed Manufacturer

FOR THE FERTILIZER INDUSTRY



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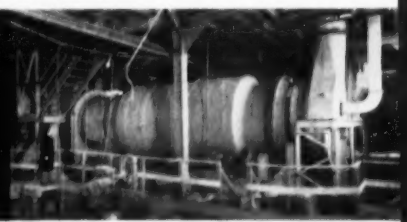
Renneburg
DehydrO-Mat
Dryer



Built in a wide range of sizes, the DehydrO-Mat Dryer, though comparable in price, out-performs conventional dryers of similar volume. Compact, it is easy to install in a minimum of space. The varying diameter cylinder regulates air and material velocities . . . controls temperature drop and product retention time . . . assures gentle drying.

Other chemical and fertilizer processing equipment manufactured by Renneburg includes: • Ammoniators • Granulators • Dryer Furnaces • Complete Air Handling Systems • Pilot Plants • DehydrO-Mat Combination Dryers and Coolers

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Southwest Conference Program Set For July 17-19

The Planning Committee of the Southwestern Fertilizer Conference and Grade Hearing met at the Buccaneer Hotel, Galveston, Texas, May 11 to plan the meeting to be held July 17, 18 and 19.

The committee is composed of: Mr. and Mrs. Stanley Hackett, Dixie Fertilizer Co., Shreveport, La.; Mr. and Mrs. W. S. Tyler, Longhorn Construction Co., Sulphur Springs, Tex.; Mr. and Mrs. Don Miller, Armour Fertilizer Works, Houston, Tex.; Mr. and Mrs. Harold Trammell, Farmers Fertilizer Co., Texarkana, Tex.; Mr. and Mrs. J. D. Dawson, Jr., Fidelity Chemical Corp., Houston, Tex.; Dr. and Mrs. J. F. Fudge, College Station, Tex.; Mr. and Mrs. Jack Lindsey, International Minerals & Chemical Corp., Shreveport, La.

The convention has been changed from the Galvez Hotel back to the Buccaneer to take advantage of the recent remodeling program undertaken by the Buccaneer.

Dr. Russell Coleman, executive vice-president of the National Plant Food Institute will have complete charge of the morning session July 18. Tom Wright, vice-president of Texas Farm Products Co., Nacogdoches, Tex. will be the golf tournament chairman on the afternoon of July 18.

The Planning Committee has promised a good band for the dance on July 18 plus several surprise entertainment features.

The Annual Grade Hearing to be conducted by Dr. J. F. Fudge, Texas A & M College, will be held Friday, July 19. Control Officials from Arkansas, Louisiana, New Mexico, Oklahoma and Texas will participate.

All members are urged to bring their families so that they can take advantage of the beach and recreational facilities of Galveston. It is also recommended that reservations be made promptly with the Buccaneer Hotel.

PROGRAM
Southwestern Fertilizer Conference & Grade Hearing
July 17, 18, 19, 1957
Buccaneer Hotel—Galveston, Texas

Wednesday, July 17

1:00 p.m. Registration

6:30-8:30 p.m. Reception honoring Technical and Control groups.

Thursday, July 18

8:00 a.m. Registration

10:00 a.m. General Meeting
Stanley Hackett, Presiding
Welcome address—J. C. Powledge
Response—Bill Dunklin
Featured Speaker — Dr. Russell Coleman

1:00 p.m.—Ladies' luncheon and reception

1:30 p.m.—Golf Tournament; Tom Wright, Chairman. Also fishing, swimming, etc.

7:00 to 8:00 p.m.—Social Hour

8:00 p.m.—Banquet and Dance

Friday, July 19

9:30 a.m.—Annual Grade Hearing
Control Officials of Arkansas, Louisiana, New Mexico, Oklahoma and Texas cooperating.

Southwest Conference Planning Committee at May meeting—SEATED: Mrs. Don Miller, Houston; Mrs. James Dawson, Houston; Mrs. Stanley Hackett, Shreveport; Mrs. Bill Tyler, Sulphur Springs, Tex.; and Mrs. Harold Trammell, Texarkana, Tex. STANDING: J. D. Dawson, Jr., Fidelity Chemical Corp., Houston; Harold Trammell, Farmers Fertilizer Co., Texarkana, Tex.; Dr. J. F. Fudge, State Chemist, College Station, Tex.; Bill Tyler, Longhorn Construction Co., Sulphur Springs, Tex.; Stanley Hackett, Dixie Fertilizer Co., Shreveport ; Don Miller, Armour Fertilizer Works, Houston; and Jimmie Powledge, Buccaneer Hotel, Galveston. (Not pictured is Jack Lindsey of International Minerals & Chemical Corp., Shreveport, who was operating the camera.)

FAIR EXCHANGE?

Someone stole a large bag of fertilizer from a manufacturer's display at a Salt Lake City garden show. But he left a same-size bag of a competitor's fertilizer in exchange. The original concern is inclined to feel flattered.

Emulsol Offers New Pesticide Emulsifier

Emulsol Chemical Corp., Chicago announces Emcol H-C as an important improvement in the field mixing of emulsifiable pesticide concentrates with liquid fertilizers. The new product is an extension of Emcols H-A and H-B which have been in production for some time.

For full details write for Technical Bulletin 47 from the company at 75 East Wacker Dr. Chicago 1, Ill.

Forget "Navadel" Hercules Asks

Hercules Powder recently announced a new name for its Hercules 528 pesticide. It turns out that the name chosen was already registered in another country, so they ask everybody to forget "Navadel" and remember Hercules 528 until a new name can be chosen and cleared.

Plastic Skin Coating Guards Against Irritation

A new skin protective coating, particularly useful to workers in fertilizer and farm chemical processing, consists of a plastic dispersed in gel form in a water base. When applied to the skin, the water base evaporates to leave a skin-hugging, continuous, elastic, plasticized film, according to the manufacturer.

Ply No. 9 Gel, the new compound offered by Milburn Co., is claimed to effectively protect against skin irritation or dermatitis for a wide variety of the chemical and mechanical irritants to which fertilizer workers are exposed.

The plastic film barrier formed by the evaporation of the ply gel is impervious to phenols, hexanes, coal tars, dry and oil-based insecticides, weed killers and crop dusts, to poison oak and poison ivy and to most organic solvents. It is attacked only by acetones and methyl and ethyl alcohols. It is soluble in water, and is not recommended against water-based irritants.

Full data can be obtained by writing to Milburn Co., 3246 East Woodbridge, Detroit 7, Mich.

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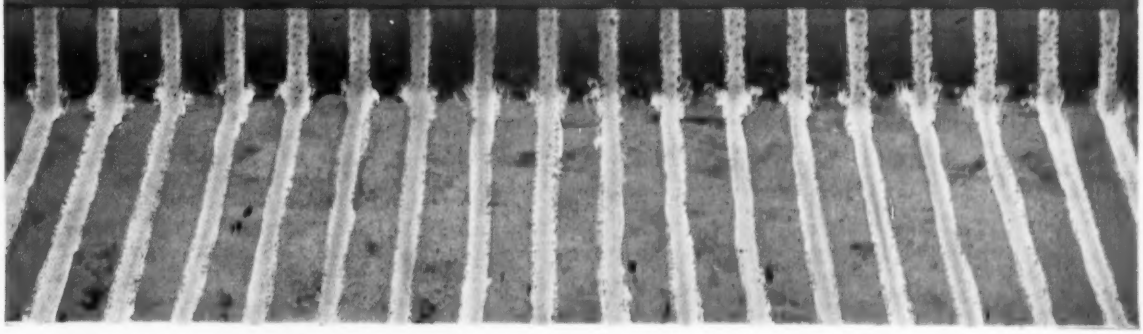

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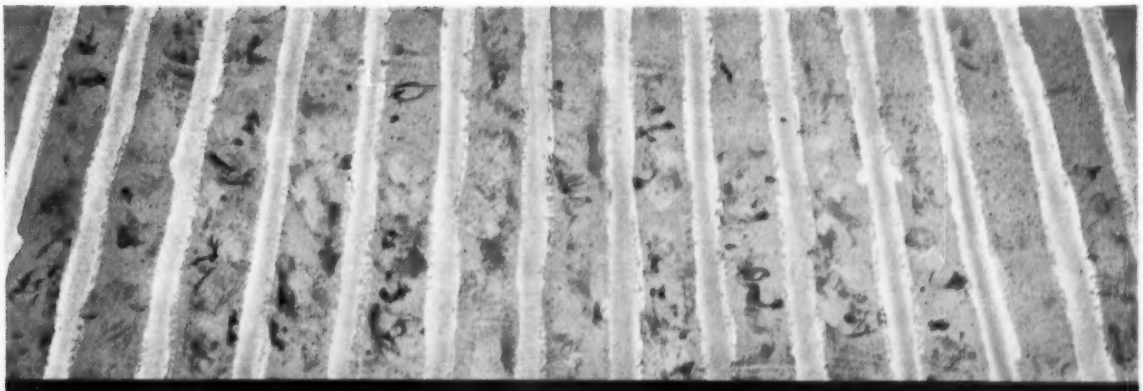

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Pacific NW Program Set

EIGHTH ANNUAL PACIFIC NORTHWEST REGIONAL FERTILIZER CONFERENCE; BENSON HOTEL, PORTLAND, ORE., JUNE 26, 27, 28, 1957

Wednesday, Thursday, and Friday mornings will be the formal parts of the program with papers being presented. Wednesday afternoon will be a field trip to the Red Soils Experiment Station near Oregon City and the Southwest Washington Experiment Station at Vancouver. Thursday afternoon will be a field trip to the Pacific Northwest Plant Food Association Demonstration Farm in Washington County and possibly to some plots in Columbia County.

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3. **Possibilities of using Fertilizers by the Forestry Industry.** Dr. Stan Gessel, University of Washington.
4. *Subject to be announced later. Speaker from National Plant Food Institute.
5. **Results from Potato Fertilizer Experiments in Central Oregon.** Malcum Johnson, Central Oregon Experimental Area.

Leave hotel at 11:15 by bus for Ore. City. Lunch at Red Soils Experiment Station.

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(Chicago Activated Sludge)

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PLANT SUPERINTENDENT wishes to make a change, 19 years experience in 50 thousand ton capacity plant. Married, 3 children, age 39. Write Box #59, c/o Commercial Fertilizer, 75-3rd St., N.W., Atlanta, Ga., for reference and business resume.

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National or Regional. 22 years in agricultural chemical industry; thorough knowledge of new Liquid Fertilizers; experience in insecticides and fertilizers in general. Will take full charge of advertising and promoting **YOUR** products, or can establish and find markets for new products for company just getting into field. Will train sales personnel that will produce. Relocation no problem. Box 6, c/o Commercial Fertilizer, 75-3rd St., N.W., Atlanta, 8, Ga.

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FOR SALE: One Corken Anhydrous Ammonia Compressor No. 91-L-107, complete with hose and fittings to unload Ammonia from Railroad tank cars to storage or nurse tanks. This outfit is almost brand new. Will sell reasonable. Farmers Cotton Oil Co., Wilson, N. C.

FOR SALE: Rotary Dryers 5' x 30', 5' x 40', 4'6" x 50', 5' x 67', 6' x 60', 9' x 80'. (1) Pressure Tank 13,000 gal. 220#. Also Mixers, Storage Tanks, Screens, Elevators. Send us your inquiries. Brill Equipment Company, 2402 Third Ave., New York 51, N. Y.

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Complete set of equipment for manufacturing and bagging fertilizer. Including 1 ton Stedman mixing unit, 400' 20" belt conveyor, 2 Hough payloaders, payloader scales, bagger, sewing machine, conveyors to loading dock, etc. All equipment is now in operation and is standard in every respect—not "Rube-Goldberg." Many more items too numerous to mention. All for $12,000. Will finance. Box 5, c/o Commercial Fertilizer, 75-3rd St. N. W. Atlanta, Ga.

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WANTED: Position as Manager or Superintendent of fertilizer factory. Over 20 years experience, thoroughly experienced in the manufacture of sulphuric acid (chamber type plant), superphosphate and mixed fertilizers. Have managed both union and non-union labor, both water front and inland factories. Can furnish excellent nationally known references. Presently employed, good reason for change. Box # 7, c/o Commercial Fertilizer, 75 - 3rd St., N. W. Atlanta, Ga.

PLANT SUPERINTENDENT wishes to make a change, 19 years experience in 50 thousand ton capacity plant. Married, 3 children, age 39. Write Box #59, c/o Commercial Fertilizer, 75-3rd St., N.W., Atlanta, Ga., for reference and business resume.

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